Analysis of Woodflow in the Coast Forest Region

Final Report – August 27th, 2003

Presented to the B.C. Ministry of Sustainable Resource Management

Prepared by:

Pierce Lefebvre Consulting
3705 West 18th Ave.
Vancouver, B.C.
V6S 1B3
Tel: (604) 224-0648
Fax: (604) 224-5722
piercelef@telus.net

D.A. Ruffle & Associates Ltd.
755 Winona Ave.
North Vancouver, B.C.
V7R 2B2
Tel: (604) 990-3594
Fax: (604) 990-3598
daruffle@shaw.ca

105-03685/

Analysis of Woodflow in the Coast Forest Region

Acknowledgements and Disclaimer

Throughout this study the consultants received excellent cooperation from the Ministry of Sustainable Resource Management, the Ministry of Forests and various industry and government representatives. We wish to thank everyone who kindly donated their time to answer questions, provide data and clarify issues. Without this help, we would not have been able to prepare this report and conduct our analysis.

In developing the data prepared for this study, the consultants have made several forecasts and assumptions utilizing information gathered under the time and resource constraints imposed on this study. These forecasts and assumptions are thought to be reasonable and suitable for the purposes of this analysis, but should not be relied upon for other purposes.

Analysis of Woodflow in the Coast Forest Region

TABLE OF CONTENTS

EXECUTIVE SUMMARY i

1 INTRODUCTION 1

2 SECURING AND TRADING FIBRE IN THE COAST FOREST REGION 5

2.1 LOG TRADING 5
2.2 CHIP TRADING 7

3 FIBRE FLOWS IN THE COAST FOREST REGION 8

3.1 REGIONAL FIBRE FLOWS 8
3.2 REGIONAL ANNUAL NET TIMBER SUPPLY 10
3.3 LOG IMPORTS AND EXPORTS 12
3.4 REGIONAL TIMBER DEMAND/ LOG USAGE 13
3.5 REGIONAL LOG DEMAND/SUPPLY BALANCE 15
3.6 REGIONAL CHIP SUPPLY AND DEMAND 16

4 MANUFACTURING FACILITIES IN THE COAST FOREST REGION 19

4.1 SAWMILLING SECTOR 19
4.2 OTHER WOOD MANUFACTURING SECTOR 19
4.3 PULP AND PAPER SECTOR IN THE COAST FOREST REGION 20
4.4 EMPLOYMENT IN THE COAST FOREST REGION FOREST INDUSTRY 21
4.5 ISSUES FACING FOREST PRODUCTS MANUFACTURING IN THE COAST FOREST REGION 24

5 SUB-REGIONAL ANALYSIS 29

5.1 LOWER MAINLAND/SUNSHINE COAST 29
5.2 VANCOUVER ISLAND 32
5.3 CENTRAL COAST 35
5.4 QUEEN CHARLOTTE ISLANDS 37
5.5 NORTH COAST 39

LIST OF TABLES

Table 1 Coast Forest Region Timber Supply Summary 10
Table 2 Annual B.C. Coast Timber Supply, 1996 and 2003 10
Table 3 Regional Timber Demand/ Log Usage by Type of Manufacturing Facility 14
Table 4 Coast Forest Region Estimated Capacity Utilization Rates (2-Shifts) 15
Table 5 Regional Log Supply/Demand Balance 15
Table 6 Regional Log Supply/Demand Balance by Industrial Sort 16
Table 7 Coast Forest Region Chip Supply/Demand Balance 17
Table 8 Product Capacity of Pulp and Paper Operations in the Coast Forest Region 21
Table 9 Summary of Employment in B.C. Coast Primary Manufacturing Facilities 22
Table 10 Lower Mainland Sub-Region Net Timber Supply, 1996 and 2003 29
Table 11 Lower Mainland Sub-Region Log Usage, 1996 and 2003 29
Table 12 Lower Mainland Sub-Region Supply/Demand by Industrial Sort 30
Table 13 Vancouver Island Net Timber Supply, 1996 and 2003 32

Table 14 Vancouver Island Log Usage, 1996 and 2003 33
Table 15 Vancouver Island Supply/Demand Balance by Industrial Sort 33
Table 16 Central Coast Timber Supply, 1996 and 2003 35
Table 17 Central Coast Annual Supply/Demand Balance by Industrial Sort 35
Table 18 Queen Charlotte Islands Log Supply, 1996 and 2003 37
Table 19 QCI Supply/Demand Balance by Industrial Sort 37
Table 20 North Coast Timber Supply 39
Table 21 North Coast Supply/Demand by Industrial Sort 39

LIST OF CHARTS

Chart 1 Map of the Coast Forest Region 2
Chart 2 Vancouver Log Market Volumes (all species), 1975-2002 6
Chart 3 Coast Forest Region Fibre Flows (m3) 9
Chart 4 2002 Share of Coast Forest Region Log Production by Forest District 11
Chart 5 Vancouver Forest Region Log Production, 1975 to 2002 12
Chart 6 B.C. Log Imports and Exports, 1996-2002 12
Chart 7 Log Exports from B.C. Coast by Country 13
Chart 8 Coast Forest Region Sawmilling Capacity by Size of Mills and Sub-Region 19
Chart 9 Coast Forest Region Direct Employment Coefficients per 000 m3 Harvested 23
Chart 10 Costs of Producing Lumber by World Supply Region ($ per mfbm) 25
Chart 11 B.C. Coast Average Logging Costs and Log Prices 26
Chart 12 B.C. Coast Log Prices and Percentage of Growing Stock by Species 26
Chart 13 Second Growth Component of Coast Timber Supply 27
Chart 14 Lower Mainland Sub-Region Fibre Flows (m3) 31
Chart 15 Vancouver Island Sub-Region Fibre Flows (m3) 34
Chart 16 Central Coast Sub-Region Fibre Flows (m3) 36
Chart 17 Queen Charlotte Islands Sub-Region Fibre Flows (m3) 38
Chart 18 North Coast Sub-Region Fibre Flows (m3) 40

LIST OF APPENDICES

APPENDIX 1 LOG PRODUCTION AND VANCOUVER LOG MARKET VOLUMES 41
APPENDIX 2 B.C. COAST REGIONAL FIBRE FLOWS 42
APPENDIX 3 B.C. AND COAST FOREST REGION LOG EXPORTS 47
APPENDIX 4 PARTIAL LIST OF PERMANENT SAWMILL CLOSURES IN COASTAL B.C. 48
APPENDIX 5 MANUFACTURING FACILITIES 49
APPENDIX 6 COEFFICIENTS OF DIRECT FOREST PRODUCTS EMPLOYMENT 53
APPENDIX 7 B.C. COAST LOGGING COSTS AND LOG PRICES 55
APPENDIX 8 SELECTED REFERENCES 56

Executive Summary

In January 2003, the Ministry of Sustainable Resource Management commissioned *Pierce Lefebvre Consulting* and Doug Ruffle of D.A. Ruffle & Associates Ltd to conduct an analysis of woodflows in the Coast Forest Region and to update some of the fibre flow data developed in a similar 1996 study of the Vancouver Forest Region by the same authors.[1] As in the 1996 study, a major part of this study was to create a database detailing fibre production and utilization of all the major forest product companies operating in the Coast Forest Region by tenure type, species, industrial sort, and sub-region. This information has been consolidated to form the fibre flow and other charts and tables contained in this report.

Timber movements in Coastal B.C. are characterized by an extensive use of sheltered ocean waterways that facilitate the transport of logs from the woodlands to manufacturing facilities. These log movements have led to a very complex web of fibre flow relationships, contracts and agreements amongst and between the wood harvesters and wood processors. It is not possible within the scope of this study, and likely not possible at all, to document or monitor each of these agreements or arrangements. Even if this were possible, the data would be valid only for some particular point in time and could not be presumed to be indicative of fibre flow trends. The study therefore concentrates on assessing fibre production and consumption patterns for the Coast Forest Region as a whole and for each of five defined sub-regions.

In early 2003, the B.C. Government outlined major policy changes to help foster the growth of the B.C. forest industry. These include major changes to B.C. Timber Sales (previously known as the Small Business Forest Enterprise Program), the return of approximately 20% of timber licenses and certain replaceable licenses to the Crown for reallocation, the implementation of various market-based forestry reforms and changes to the stumpage system. It is outside the scope of this study to speculate on the impacts of these policy changes on woodflows in the Coast Forest Region, but the data in this report will be useful in providing a benchmark for future assessments of the impacts of policy changes in the forest sector.

A. Regional Analysis

Timber Supply

The physical supply of standing timber that is available for harvesting each year includes regulated timber supply from Crown lands, timber supply from privately held Managed Forests, and unregulated supply, mainly from private lands. The regulated timber supply from Crown lands includes the Allowable Annual Cut (AAC) from Timber Supply Areas (TSAs) and Tree Farm Licenses (TFLs) as well as an average annual harvest for Timber Licenses. In any given year, actual log production may be lower or higher than timber supply as defined above, due to market conditions and cut-control requirements (under the British Columbia Forest Act, license holders may postpone the harvest of a portion of their AAC to another year).

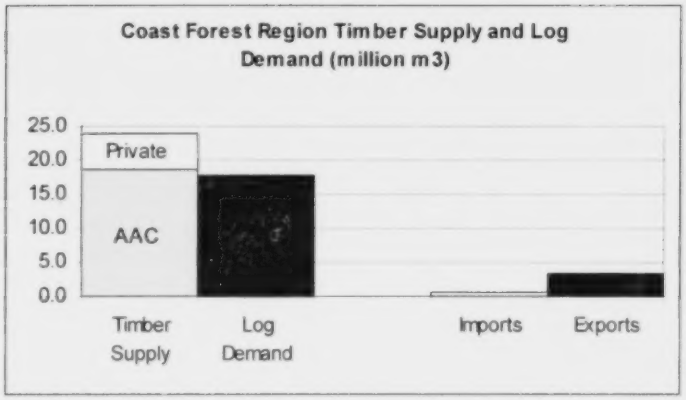
In 2003, timber supply from the Coast Forest Region adds to 24 million m3, after allowing 4% for recoverable waste, and excluding 600,000 m3 in log imports.

---

[1] Simons Reid Collins and Pierce Lefebvre Consulting, *Analysis of Woodflow in the Vancouver Forest Region, Final Report*, Ministry of Forests, April 22, 1996.

Log Usage/Demand

Log usage in the Coast Forest Region is estimated at 17.7 million m3, based on a 5-year average operating rate for all primary processing mills that are either operating or temporarily closed effective March 2003. A 5-year average is applied, rather than annual data, to help smooth out cyclical market changes and better reflect fibre utilization trends.



While the 5-year average log usage from currently operating mills in the Coast Forest Region is estimated at 17.7 million m3, milling capacity is much greater at approximately 25.2 million m3 based on 2-shift capacity (effective March 31, 2003). Log usage of 17.7 million m3 translates to a utilization rate of 70% of 2-shift capacity.

Based on 2002 data, log exports from the Coast Forest Region are estimated at 3.2 million m3, or approximately 13% of the physical supply of timber from Crown and private lands (i.e. excluding log imports).

Log Supply/Demand Balance

The physical timber supply of 24 million m3 for the Coast Forest Region exceeds log usage of 17.7 million m3 by 26% or approximately 6.3 million m3. After accounting for imports of 0.6 million m3 and exports of 3.2 million m3, the physical supply of timber still exceeds log usage by approximately 3.6 million m3.

The demand for logs has been lower than the physical supply of logs because many forest stands have not been economically accessible and logging costs are exceeding the value of delivered logs. Some of the factors affecting the cost competitiveness of the coastal forest industry include:

- B.C. and Canadian mills are facing average countervailing and anti-dumping duties of 29% when exporting to U.S. markets.
- The B.C. Coast was particularly affected by the decline in Asian markets and the 1996 quota restrictions imposed by the Canada-U.S. Softwood Lumber Agreement that expired in spring 2001.
- The decline in Asian markets particularly affects hemlock-balsam, which represents approximately 64% of the growing stock in the Coast Forest Region.
- On average, the cost of producing lumber on the B.C. Coast is higher than in all other North American lumber producing regions and most supply regions in the world (almost $200 per mfbm higher than the average cost for the B.C. Interior, before the countervailing and anti-

dumping duties are taken into account).

- Average logging costs in Coastal B.C. have increased from $67 per m3 in 1992 to some $108 per m3 in 2001 (although logging costs are lower than they were in 1996).

Coastal B.C. has seen significant growth in log exports in the last five years from almost nothing in 1996 to the 3.2 million m3 in log exports for 2002. The large growth in exports is also a function of the high manufacturing cost brought on partly as a result of the countervailing and anti-dumping duties on lumber exported to the U.S. In B.C., log exports from Crown land and private lands granted after March 1906 are prohibited without an Order in Council from the Provincial Government. Furthermore all log exports are subject to domestic needs testing, whereby local mills have the option to block exports by purchasing the logs at domestic prices, which are less than export prices. With many Coastal mills temporarily or permanently closed, significantly less blocking has occurred in the past 5 years.

Log Trading and Distribution

Major timber licensees in the Coast Forest Region hold tenures for 81% of the Crown lands timber harvest. These include Canadian Forest Products (Canfor), Doman/Western Forest Products, International Forest Products (Interfor), Weyerhaeuser, TimberWest and four smaller companies. An estimated 36 licensees that hold smaller volume licenses, as well as many small manufacturers obtaining timber from the Small Business Forest Enterprise Program, hold the other 19%. Large companies such as NorskeCanada that own manufacturing plants but no timber tenures typically arrange for long-term chip or log procurement contracts with tenure holders and manufacturing plants.

While companies may hold forest tenures on Crown lands that cover some or all of their timber requirements, they tend to trade logs on a day-to-day basis, according to their mills' species, grade and size requirements. This trading pattern has been facilitated by the use of waterways for log distribution and storage.

The arrangements for selling, buying and trading logs are commonly referred to as the Vancouver Log Market (VLM). In 2002, some 3.9 million m3 of logs were traded on the VLM, or approximately 18% of the Coast Forest Region harvest. Sawlogs accounted for 88% of the logs traded on the VLM in 2001 and pulplogs accounted for the other 12%.

Chip Supply and Demand

Current chip usage is estimated at 12.6 million m3 based on 5-year operating rates for the Coast Forest Region pulp and paper industry. Chip production in the Coast Forest Region (residual chips, chipping plants and woodrooms) is estimated at 9.3 million m3, based on operating or temporarily closed manufacturing facilities as of March 2003. This is not sufficient to meet the regional chip demand, and imports from the B.C. Interior add almost 3.2 million m3 to the Coast Forest Region chip supply. Chip imports from the U.S. are negligible, particularly after netting out chip exports.

Manufacturing Facilities

The Coast Forest Region has approximately 145 primary wood processing plants, including 78

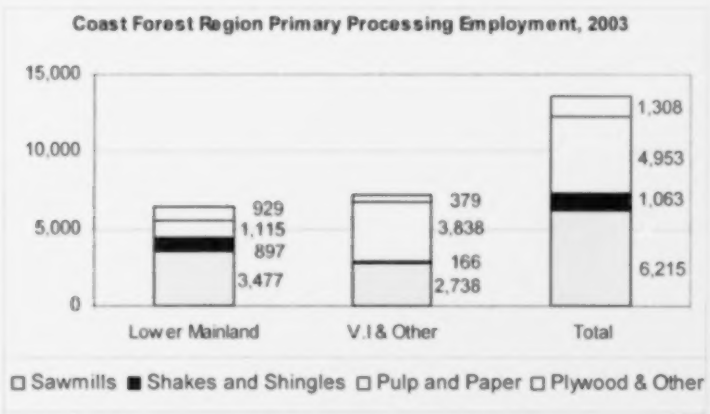
sawmills, 44 shake and shingle mills, 3 veneer/plywood plants and 20 other plants including some custom chippers, woodrooms and pole and post plants. All but 4 small mills are in the Vancouver Island and Lower Mainland/Sunshine Coast sub-regions.

Sawmills in the Coast Forest Region account for approximately 65% of the total regional log usage, chipping plants and woodrooms use 24% and the balance of the mills share the remaining 11%. The 15 largest Coastal sawmills account for 59% of sawmilling capacity. The other 63 sawmills share the remaining 41% of sawmilling capacity (sawmilling capacity is expressed in terms of log input requirements at 2-shift capacity).

The Coastal region has 8 pulp and paper mills that utilize softwood chips and logs for their raw materials. Three are in the Lower Mainland/Sunshine Coast sub-region and 5 are in the Vancouver Island sub-region. The companies operating pulp and paper facilities in the Coast Forest Region include: Howe Sound Pulp and Paper (50% owned by Canadian Forest Products and 50% by Oji Paper), NorskeCanada, Pope & Talbot and Doman/Western Pulp.

In addition to those 8 pulp and paper operations, there are three other paper making facilities in the Lower Mainland that do not use softwood chips or coniferous logs for their raw materials and are considered secondary manufacturing facilities. They include Scott Paper, Island Paper Mills and Newstech Recycling.

Employment



The Coast Forest Region primary wood products and pulp and paper processing sectors directly employ 13,539 people, excluding the three secondary pulp and paper operations (employing 1,192 people). This is comprised of sawmill employment (6,215), shake and shingle mill employment (1,063), primary pulp and paper employment (4,953) and plywood, veneer, poles and other employment (1,308). The sawmill employment split is 56% Lower Mainland sub-region and 44% Vancouver Island sub-region, while the primary pulp and paper employment split is 23% Lower Mainland sub-region and 77% Vancouver Island sub-region.

In addition, timber harvesting and wood processing also generate employment through suppliers of goods and services to the forest industry (indirect employment) and through the re-spending effects of the direct and indirect employees (induced employment).

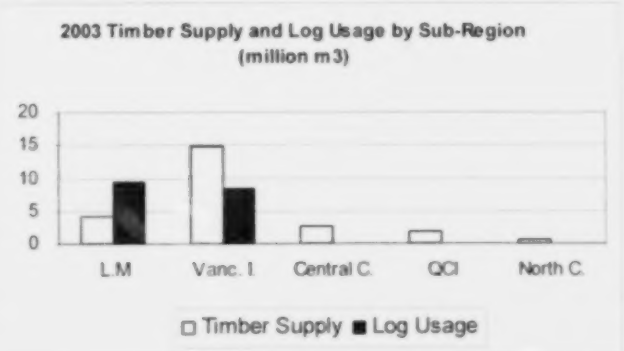
Based on these employment figures and the fibre input data, the Coast Forest Region primary industries generate 1.254 direct Person Years (PYs) of employment per 000 m3 of wood harvested. The employment data were adjusted to take into account log and chip imports and the low utilization rates of certain operations.

B. Sub-Regional Analysis

Lower Mainland/Sunshine Coast

The timber supply from the Lower Mainland/Sunshine Coast sub-region totals 4.2 million m3 while log demand/usage in the sub-region totals 9.3 million m3. With net exports of 0.7 million m3, the Lower Mainland/Sunshine Coast sub-region requires 5.7 million m3 in log transfers from other Coastal sub-regions to maintain its manufacturing facilities.

Pulp and paper operations in the Lower Mainland/Sunshine Coast sub-region consume an estimated 4.7 million m3 of chips. The chip supply adds to 6.2 million m3 including whole log and residual chips from the sub-region and 1.9 million m3 of residual chips imported from the B.C. Interior. The chip surplus from the Lower Mainland sub-region of 1.5 million m3 is transferred to the Vancouver Island sub-region.



Vancouver Island

The annual timber supply from Crown and private lands on Vancouver Island adds to 14.8 million m3. This compares to average log usage of 8.4 million m3. After net exports of 1.5 million m3, the Vancouver Island sub-region has a log surplus of 4.9 million m3.

Vancouver Island pulp and paper operations require approximately 7.9 million m3 of fibre, with residual chips, chipping plants and woodrooms in the sub-region supplying 4.8 million m3. Vancouver Island receives a transfer of some 1.5 million m3 in chips from the Lower Mainland sub-region, and imports 1.6 million m3 from outside the Coast Forest Region.

Central Coast

The net annual timber supply for the Central Coast adds to 2.7 million m3. Log usage is minimal and log exports are estimated at 271,000 m3, which results in a net log surplus for the sub-region of approximately 2.4 million m3.

Queen Charlotte Islands (QCI)

The net annual timber supply for QCI adds to 1.7 million m3. Log usage is minimal and log exports are estimated at 155,000 m3, which results in a net log surplus for the sub-region of approximately 1.5 million m3.

North Coast

The net annual timber supply for the North Coast adds to 0.5 million m3. Log usage is minimal and log exports are immaterial (about 31,000 m3), which results in a net log surplus for the sub-region of approximately 0.5 million m3.

C. Significant Changes Between 1996 and 2003

The observations that follow are based on comparing data presented in the 1996 Analysis of Woodflow in the Vancouver Forest Region with the findings of the 2003 Woodflow study. To facilitate this comparison, data for the North Coast sub-region are excluded from the 2003 data.

Timber Supply

The overall B.C. Coast timber supply has remained reasonably stable between 1996 and 2003 (-3.3%), in spite of some substantial changes in its composition. The timber supply from Crown lands dropped by 16.2%, including allowable annual cut declines of 18% for Timber Supply Areas (TSAs), 8.3% for Tree Farm Licenses and reductions in Timber License harvest of 63.1%. This decline was substantially counterbalanced by a 53.1% increase in the rate of harvest from private lands.

Timber Demand/ Log Usage/ Manufacturing Facilities

Timber demand/log usage in the Coast Forest Region has declined by 30% since 1996 (from 25.3 million m3 in 1996 to 17.7 million m3 in 2003). This includes major declines in both sawlog and pulp log usage, caused by permanent mill closures as well as temporary closures and other production curtailments.

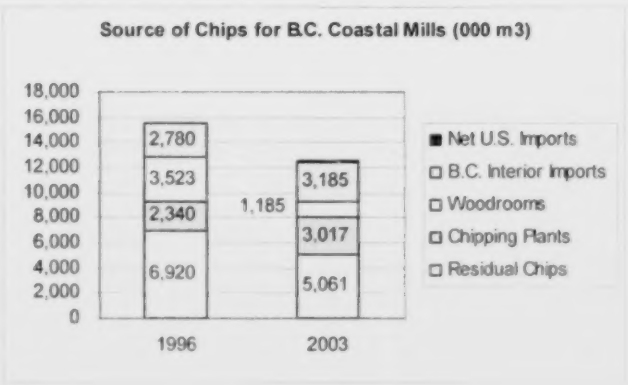
The majority of the large wood processing operations that permanently closed in recent years in Coastal B.C., have been in the Lower Mainland/Sunshine Coast sub-region. Larger mills that have permanently closed had processed a total of 4.5 million m3 of logs; closed mills in the Lower Mainland sub-region processed 73% or 3.3 million m3 of this, and closed mills on Vancouver Island had processed the other 27%.

Average Coast Forest Region log usage of 17.7 million m3 represents 70% of 2-shift capacity. By comparison, in 1996, sawmills on Vancouver Island and the Lower Mainland sub-region operated at 82.4% of 2-shift capacity.

Partly as a result of the relatively low levels of log usage, log exports from the B.C. Coast increased from an estimated 200,000 m3 in 1996 to 3.2 million m3 in 2002.

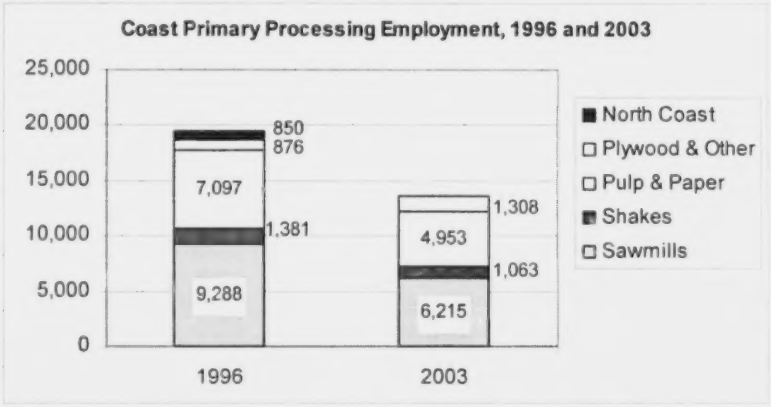
Chip Supply and Demand

Chip usage is down 3 million m3 or 19% since 1996, mainly due to the permanent closures of the Gold River pulp mill, the Powell River pulp mill and some of the woodrooms. There have also been production curtailments at some of the other operations and a shift from woodrooms to custom chipping plants. Chip imports from the B.C. Interior have increased from 2.8 million m3 in 1996 to almost 3.2 million m3 in 2002.



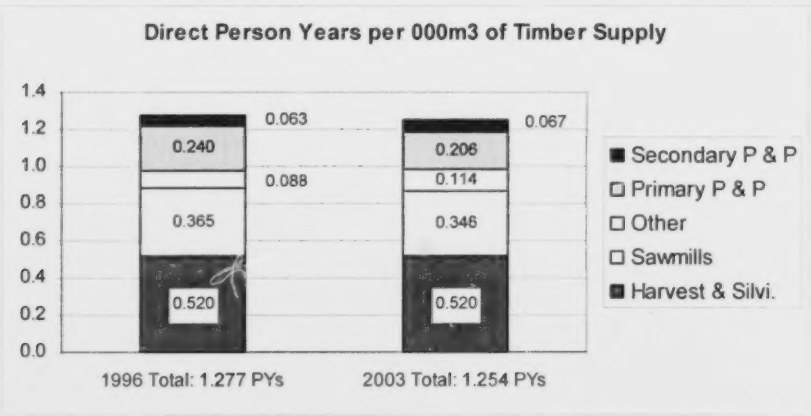
The chip supply and demand data for the Coast Forest Region excludes the Skeena Cellulose pulp mill facility in Prince Rupert, which has been closed since 2001. In 1996, the mill produced approximately 430,000 ADMT per year from 2 pulp lines, requiring some 2.4 million m3 of fibre. Northwest B.C. Timber Pulp Ltd. has indicated its intention of re-opening the pulp mill at an annual capacity of 385,000 tonnes, which would require approximately 2.1 million m3 per year.

Employment



The Coast Forest Region primary wood products and pulp and paper processing sectors directly employ 13,539 people, which is 27% fewer people than were employed in those sectors in the Vancouver Forest Region in 1996 (in 1996, 18,642 people were employed in VFR primary processing facilities). Also, in 1996, there were 850 people employed at sawmills and pulp and paper operations in the North Coast, but these operations have been closed since 2001.

The Coast Forest Region primary industries generate 1.254 direct Person Years (PYs) of employment per 000 m3 of wood harvested, or 1.8% less than the coefficient of 1.277 PYs per 000 m3 that was estimated for 1996. While the employment coefficient dropped in primary sawmilling and primary pulp and paper manufacturing, this decline was compensated through an increase in the coefficients for other products.



Note: Does not add due to rounding.

1 Introduction

The forest industry in the Coast Forest Region has developed around an extensive network of sheltered waterways used to transport logs from the woodlands to manufacturing facilities. The efficiencies associated with water borne transport of logs and barging of chips contribute to the relatively easy flow of wood fibre throughout coastal areas. Consequently, woodflows in the Coast Forest Region are very complex with companies engaging in extensive trading to match species, size and grade requirements of the individual mills. The proximity of a mill site to a harvest area is not necessarily the deciding factor in determining where logs from a given stand of timber will be manufactured.

In January 2003, the Ministry of Sustainable Resource Management commissioned *Pierce Lefebvre Consulting* and Doug Ruffle of D.A. Ruffle & Associates to conduct an analysis of woodflows in the Coast Forest Region and update some of the data collected as part of a similar analysis of woodflows conducted for the Vancouver Forest Region in 1996. Part of the rationale for conducting this study is the continuing need to better understand the sub-regional and regional socio-economic impacts of timber harvest and log usage in Coastal B.C.

The primary objectives of the study are to document fibre flows within the Vancouver Forest Region and forest products employment associated with wood processing facilities in the region. The scope of the study is as follows:

- **Fibre Flows**. The analysis reviews harvesting and processing of fibre by operation and by sub-region. In this study, fibre flows do not reflect the actual movement of timber from harvest to the ultimate processing location, but rather represent production and consumption patterns for the Coast Forest Region by sub-region. Log movements along Coastal B.C. have led to a very complex web of fibre flow relationships, contracts and agreements amongst and between the wood harvesters and wood processors. It is not possible within the scope of this study, and likely not possible at all, to document or monitor each of these agreements or arrangements. Even if this were possible, the data would be valid only for some particular point in time and could not be presumed to be indicative of fibre flow trends.
- **Processing Facilities**. The profile includes fibre requirements, capacity utilization and employment for all major primary manufacturing facilities.

- **Sub-Regions**. The analysis reviews woodflows for five sub-regions namely:
    - The North Coast: includes the North Coast Forest District (FD) (Prince Rupert);
    - The Central Coast: includes the mainland portions of both the Campbell River FD and North Island-Central Coast FD (Port McNeil and Hagensborg);
    - Vancouver Island: includes the South Island FD (Port Alberni, Nanaimo, Duncan) and the Vancouver Island portions of the Campbell River FD and North Island-Central Coast FD;
    - Lower Mainland: includes the Sunshine Coast FD (Powell River and Sechelt), Squamish FD and the Chilliwack FD; and
    - The Queen Charlotte Islands: includes the Queen Charlotte Islands FD.

A map of the Coast Forest Region is reproduced following.

Chart 1 Map of the Coast Forest Region

Note: Only the communities with Ministry of Forests offices are noted on the map.
Source: Ministry of Forests web site, www.for.gov.bc.ca.

There are a number of factors, which complicate wood flows in the Vancouver Forest Region. These include:

- Log trades due to specie, grade and size requirements of individual mills.
- Chip trades among mills in the various sub-regions.
- Harvest volumes are reported by the MoF's statutory grades, but trading and manufacturing are based on industrial sorts. For example, the grade rules for utility hemlock-balsam (code U) specify that at least 50% of the gross scale can be manufactured into lumber, yet most U grade logs are sorted as pulplogs.
- Importance of harvests by private landowners such as TimberWest and Weyerhaeuser.
- Existence of the Vancouver Log Market.

This study attempts to assess timber flows by sub-region, recognizing the complexities of assessing woodflows in the Coastal Forest Region. The study methodology was as follows:

- Document how forest products companies secure and trade fibre in the Coast Forest Region.
- Review and analyze fibre flows by company and by sub-region.

- Develop a profile of primary manufacturing facilities by sub-region based on Ministry of Forests data and discussions with individual companies and operations.

- Collect B.C. Stats data on B.C.'s log and chip imports and exports to/from other countries.

- Collect company data on log and chip imports and exports to/from the B.C. Interior to/from the Coast Forest Region.

- Assess timber supply for each sub-region effective March 31, 2003. The level of timber (or log) supply incorporates the current AACs for TSAs and TFLs and estimates of timber supply from Timber Licences, privately owned Managed Forests, unregulated private lands and net imports from outside the Coast Forest region.

- Assess log usage/ demand from primary manufacturing plants based on 5 year historical production levels, tempered with recent Ministry of Forests data. Only those mills currently operating or temporarily closed were included.

- Develop regional employment coefficients to help assess the employment impacts associated with timber harvesting and processing.

The main documents and information sources used for this study included:

- Simons Reid Collins and Pierce Lefebvre Consulting, *Analysis of Woodflow in the Vancouver Forest Region, Final Report*, Ministry of Forests, April 22, 1996 (in this report, this analysis is referred to as the 1996 Woodflow study).

- Ministry of Forests Economics and Trade Branch, *Major Primary Timber Processing Facilities in B.C.*) from 1997 to 2001 (unpublished data).

- Ministry of Forests Billing History Report and the Coast Grade Distribution Reports

- Pierce Lefebvre Consulting and Doug Ruffle & Associates, *Study of Pollution Prevention Opportunities in the Coastal Forest Industry With Respect to Dioxins and Furans*, Canadian Council of Ministers of the Environment, draft report, June 2002; as part of this report, the consultants prepared a detailed review of the coastal log distribution system and some sections of this study, such as the review of the Vancouver Log Market are based on that report.

A list of reference documents is included as an Appendix at the end of this report.

This study reviews fibre production and consumption patterns for each B.C. Coast sub-region. Key measurement parameters used throughout this analysis are defined following:

- ***Timber Supply***: the annual physical supply of standing timber that is available for harvest from Crown lands (based on the Allowable Annual Cut (AAC)), and from private lands (based on historical harvest), after allowing for 4% recoverable waste. In any given year, actual log production may be lower or higher than timber supply due to market conditions and cut-control requirements (under the British Columbia Forest Act, license holders may postpone

the harvest of a portion of their AAC to another year).

- ***Log Production***: actual log harvest from Crown and private lands as reported by the Ministry of Forests.

- ***Log Usage/Demand***: log utilization by mills in the Coast Forest Region, based on a 5 year average operating rate for all primary processing mills that are either operating or temporarily closed effective March 2003. A 5-year average is applied, rather than annual data to help smooth out cyclical market changes and better reflect fibre utilization trends. Log usage may be lower or higher than mill capacity.

- ***Mill Capacity***: log input milling capacity assuming two shifts per day.

- ***Exports and Imports***: fibre flows out of and into the Coast Forest Region. Transfers refer to fibre flows between the five sub-regions (Lower Mainland, Vancouver Island, Central Coast, Queen Charlotte Islands and North Coast) defined for this study, comprising the Coast Forest Region (CFR).

The research was conducted in February and March 2003. Sylvie Lefebvre of *Pierce Lefebvre Consulting* was project manager and collected much of the data from industry, the Ministry of Forests, BC Stats and other sources. Doug Ruffle was a key consultant on the project and prepared the woodflow model. Claude Pierce assisted with some of the research and the reporting. The following report summarizes our findings.

2 Securing and Trading Fibre in the Coast Forest Region

2.1 Log Trading

The Coastal forest industry in B.C. continues to be dominated by a few large forest product companies, but the industry structure has changed substantially over the past decade. In the mid 1990s, the Coastal forest industry consisted mainly of large integrated conglomerates with large timber tenures, wood processing facilities and pulp and paper operations. Increasingly, however, companies are choosing to re-focus on specific sub-sectors of the industry.

The major Crown land timber harvesting tenure holders in the Coast Forest Region include Canadian Forest Products (Canfor); Doman/ Western Forest Products; International Forest Products (Interfor); Weyerhaeuser; and TimberWest. Each of these companies has harvesting tenures exceeding 1 million m3 per annum. In addition, there are seven licensees with allowable annual cuts (AAC) of between 100,000 m^3 and 350,000 m^3 and another 34 with licenses under 100,000 m^3. Many other small manufacturers obtain timber from the Small Business Forest Entreprise Program (SBFEP) with access to 1.7 million m^3 per annum.

Doman/ Western Forest Products, Interfor and Weyerhaeuser have extensive sawmilling and wood processing facilities on the Coast, but of those three companies, only Doman continues to own pulp and paper operations in Coastal B.C. TimberWest has 1.2 million m^3 of Crown AAC on the Coast with one sawmill, and Canfor has 1.3 million m3 of Crown timber on the coast but no sawmill (although Canfor has a 50% ownership in Howe Sound Pulp and Paper, which operates a pulp and paper mill and sawmill/chipping mill). TimberWest, Weyerhaeuser and to a lesser extent Doman, also own significant tracts of private managed forests lands (approximately 3.5 million m3 in annual cut including 2 million m3 for TimberWest, 1.1 million m3 for Weyerhaeuser and 355,000 m3 for Doman[2]). Other licensees hold private managed forests lands with an annual cut of 0.4 million m3 and the annual cut from unregulated private lands adds another 1.7 million m3.

NorskeCanada now owns 4 major pulp and paper operations in the Coast Forest Region including mills at Powell River and Port Alberni, which in 1996 were owned by MacMillan Bloedel, and mills at Campbell River and Crofton, which in 1996 were owned by Fletcher Challenge. Pope & Talbot owns the Harmac market pulp mill on Vancouver Island.

Companies with large capital intensive pulp and paper operations tend to rely on their own tenures for wood fibre supply or secure long term fibre supply contracts with other tenure holders rather than relying on supplies from the Vancouver Log Market (VLM). Companies do not necessarily mill the actual timber harvested from their tenures, as the cut profile from their tenures may not match their mill requirements at any given time. As a result, on a day-to-day basis, forest product companies trade logs according to their mills' species, grade and size requirements.

Log trading has long been a characteristic of the B.C. Coastal forest industry largely because of the extensive use of the sheltered waterways, which facilitate the transport of logs from the

[2] Doman has a long-term log supply agreement with TimberWest, which is the main source of this volume

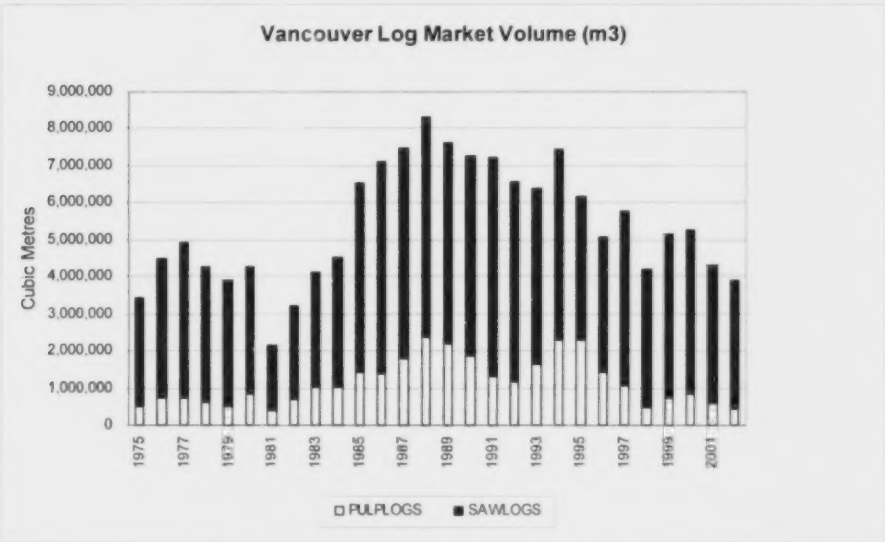
woodlands to a large number of wood manufacturing facilities. The arrangements for selling, buying and trading logs that have evolved are commonly referred to as the Vancouver Log Market (VLM).

The VLM consists primarily of a communications network involving log brokers, company log buyers and sellers and agents dealing over telephones, faxes and electronic mail with logging, sawmill, pulpmill and plywood companies as well as foreign importers. The VLM volumes include arms-length sales of logs from the areas along the south coast and Vancouver Island as well as Queen Charlotte Strait south of Cape Caution (on the Lower Mainland east of the northern tip of Vancouver Island). This would exclude any sales made in the QCI, Central Coast and North Coast Forest Districts, however since most logs are barged from these Districts into the Howe Sound/Chemainus areas prior to sale and there are no major mills in these Districts, the VLM volumes include almost all sales volumes from these areas. In particular, a high proportion of the pulplogs sold on the VLM originate from the North and Central Coast.

Companies trading on the VLM often develop long-term log supply relationships with one another. These ties develop between firms that have complementary differences between the species and grades of logs they harvest and those required for their mills. These relationships also involve chips and hog fuel.

In 2002, some 3.9 million m3 of logs were traded on the VLM, or approximately 18% of the Coast Forest Region harvest. Sawlogs accounted for 88% of the logs traded on the VLM in 2002 and pulplogs accounted for the other 12%. The following chart shows the volumes of sawlogs and pulplogs traded on the VLM between 1975 and 2002.

Chart 2 Vancouver Log Market Volumes (all species), 1975-2002



Source: Ministry of Forests and Council of Forest Industries. Refer to Appendix 1

2.2 Chip Trading

Virtually all of the transactions in the chip market involve trades of chips between the large integrated companies, and chip sales by the independent sawmills. Like sales in the VLM, these transactions are frequently made subject to reciprocal sales. For the independent sawmills, these chip sales can provide the opportunity to trade chips for sawlogs at the respective market prices for chips and logs.

The pulp and paper companies generally enter contractual agreements with individual sawmills in B.C. to purchase their chip production. Contracts are often for a six month or one-year period, but they tend to be renewed each year as pulp and paper companies generally have long-term relationships with individual sawmills. In some cases, there are longer term contracts to supply chip production. For example, Pope & Talbot (Harmac mill) has a contract to purchase 80% of its chip requirements from Weyerhaeuser, an agreement that was reached when MacMillan Bloedel divested its interests in the Harmac mill to Harmac Pacific in the early 1990s.
Once contractual agreements are secured, companies often enter into additional trading between pulp and paper mills in order to minimize transportation costs and match species requirements of the pulpmills with the available supply.

3 Fibre Flows in the Coast Forest Region

This section of the report and accompanying charts summarize regional fibre flows for Coastal B.C. Appendix 2 provides detailed tables of regional fibre flows, log usage/demand, timber supply by species, log usage by type of mill, and chip supply and demand.

3.1 Regional Fibre Flows

The regional fibre flows represent the interrelated levels of softwood supply and demand in two raw material markets: logs and chips. The level of timber (or log) supply was estimated as of March 2003 and incorporates the then current AACs for TSAs and TFLs. Estimates of B.C. imports and exports are from BC Stats. Estimates of the current supply from Timber Licences, Managed Forests, unregulated private lands and net imports from the B.C. Interior are based on MoF data and discussions with company representatives and others. In this report, exports and imports refer to fibre flows out of and into the Coast Forest Region. Transfers refer to fibre flows between the five sub-regions (Lower Mainland, Vancouver Island, Central Coast, Queen Charlotte Islands and North Coast) defined for this study, comprising the Coast Forest Region (CFR).

Demand from primary manufacturing plants is calculated from 5-year historical production levels, tempered with recent data from the MoF surveys of major processing facilities. Only those mills currently operating or temporarily closed are included. Mills that are permanently closed effective March 2003 are excluded. Log and chip demand represents log usage, which itself is a function of the viability of manufacturing facilities and is affected by factors such as the recent imposition of countervailing and anti-dumping duties averaging 29% when exporting to U.S. markets.

Regional chip supply comes from primary manufacturing facilities such as lumber mills, custom chippers and pulpmill woodrooms, and is also based on 5-year historic production levels. Net imports provide the balance. Demand is measured for each pulpmill based on current and short-term projections of operating rates and fibre use factors.

The chart on the following page presents the regional fibre flow for the Coast Forest Region.

As shown on the chart, the Coast Forest Region shows a fibre supply surplus of 3.6 million m3, even after accounting for 3.2 million m3 in log exports. The fibre supply surplus reflects the increasingly difficult economic situation for B.C. Coastal mills. In the last 5 to 7 years, B.C. Coastal mills have struggled with relatively high logging and manufacturing costs, a declining Asian market for hemlock and balsam products, export quotas to the U.S. markets and subsequently, the softwood lumber countervailing duties and anti-dumping duties applicable to exports to the U.S.

The fibre flow situation in Coastal B.C. has changed significantly over the last 5 or 6 years. In 1996, the Woodflow analysis reported that fibre flows in Coastal B.C. were almost in balance with a very small fibre deficit of approximately 0.4 million m3 (based on 5 year average production rates, not processing capacity).

Chart 3 Coast Forest Region Fibre Flows (m3)

3.2 Regional Annual Net Timber Supply

The annual timber supply from Crown and private lands in the region is estimated at 24.0 million m3, net of an assumed 4% for recoverable waste. Of this, some 78% is from Crown lands and approximately 22% is from private lands. Vancouver Island delivers 62% of the annual timber supply in the Coast Forest Region including 91% of the private land timber supply and 54% of the timber supply from Crown lands.

Table 1 Coast Forest Region Timber Supply Summary

Timber Supply by Tenure	Volume (000 m3)						% of Total
	Van. Island	Lower Mainland	Central Coast	QCI	North Coast	Total	
Timber Supply Areas	1,793	2,786	1,866	361	547	7,353	29.4%
Tree Farm Licences	8,315	1,016	833	1,340	0	11,504	46.0%
Timber Licences	345	195	89	21	5	655	2.6%
Total from Crown Lands	10,453	3,997	2,788	1,722	552	19,512	78.0%
Private Lands	4,990	379	50	75	0	5,494	22.0%
Total Annual Timber Supply	15,443	4,376	2,838	1,797	552	25,006	100.0%
Less: Recoverable Waste	618	175	114	72	22	1,000	
Net Annual Timber Supply	14,825	4,201	2,724	1,725	530	24,006	
	62%	17%	11%	7%	2%	100%	

The annual timber supply is approximately 3% less than in 1996: 23.5 million m3 after excluding the North Coast, compared to 24.27 million m3 as reported in the 1996 Woodflow study (the North Coast was not a part of the 1996 Woodflow study). Net recoverable waste is estimated at 4%, down from the 7.5% assumed in 1996. In recent years, the logging sector has tried to lower costs by recovering greater volumes of timber, and the increasing proportion of second growth harvest may be resulting in less waste.

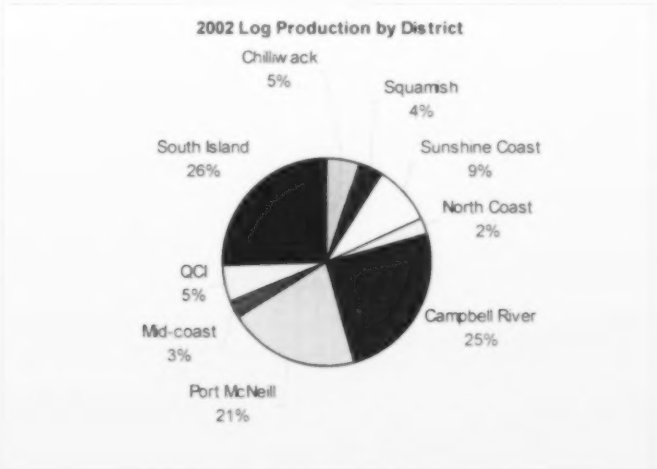
Table 2 Annual B.C. Coast Timber Supply, 1996 and 2003

Timber Supply by Tenure	Volume (000 m3)			% Change 1996-2003 Excl. North Coast
	1996 (Excl. North Coast)	2003 (with North Coast)	2003 Excl. North Coast	
Timber Supply Areas	8,302	7,353	6,806	-18.0%
Tree Farm Licences	12,552	11,504	11,504	-8.3%
Timber Licences	1,763	655	650	-63.1%
Total from Crown Lands	22,617	19,512	18,960	-16.2%
Private Lands	3,589	5,494	5,494	53.1%
Total Annual Timber Supply	26,206	25,006	24,454	-6.7%
Less: Recoverable Waste	1,936	1,000	978	-49.5%
Net Annual Timber Supply	24,270	24,006	23,476	-3.3%

The AAC for the timber supply area tenures dropped by 18% between 1996 and 2003 (excluding the North Coast), but the drop in volume was partly offset by the increase in the private land harvest, which increased by 53%. Major timber licensees on the Coast[3] hold 81% of Crown timber (51% of TSAs, 94% of TFLs and 73% of Timber Licenses) and control 62% of the private land harvest. Between 1996 and 2003, the drop in timber supply from Crown lands affected the major timber licensees more than other licensees as major licensees have a greater percentage of the cut in areas that suffered the greatest decline in timber supply (Appendix 2).

The annual supply of timber is based on the AAC for Crown lands and average harvests for the private lands. In any given year, however, harvesting on Crown lands may vary around the AAC by plus or minus 50%, as long as the harvest is within plus or minus 10% of the AAC over a 5 year period (the so-called cut control rules). In 2003, the B.C. Government introduced a new policy stating that there will no longer be any penalties for failing to cut timber, but licensees will not be able to carry forward uncut portions of their AAC to future periods.[4] The annual timber supply (quantity available for harvest) of 25 million3 before the 4% recoverable waste compares to a 2002 log production (quantity actually harvested) from the B.C. Coast of 21.8 million m3, split among the various forest districts as follows.

Chart 4 2002 Share of Coast Forest Region Log Production by Forest District

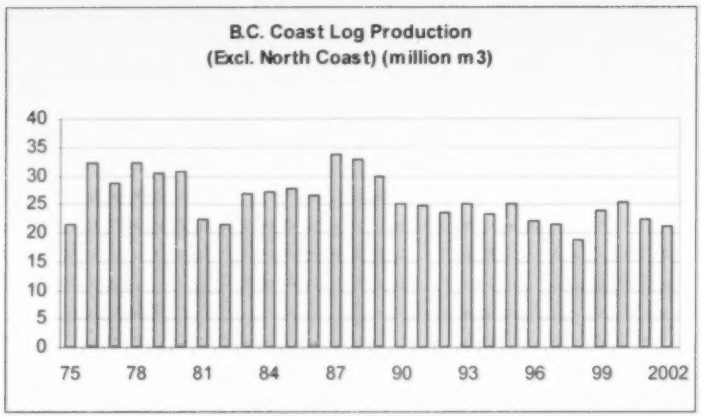


Prior to 2002, the Coast Forest Region was called the Vancouver Forest Region (VFR), and did not include the North Coast Forest District. The following graph shows the VFR log production from 1975 to 2002. During that period, log production in the VFR peaked in 1987 at 33.8 million m3 and averaged 26 million m3. By comparison, in the last 5 years, average VFR log production has been 22.5 million m3 (Appendix 1).

---

[3] Major companies include: Doman/Western Pacific, Canfor/Howe Sound, TimberWest, Interfor, Weyerhaeuser, Mill & Timber, Richmond Plywood, Teal Cedar/J.S. Jones and Terminal Forest Products.
[4] B.C. Ministry of Forests, *B.C. Heartlands Economic Strategy, The Forestry Revitalization Plan*, 2003.

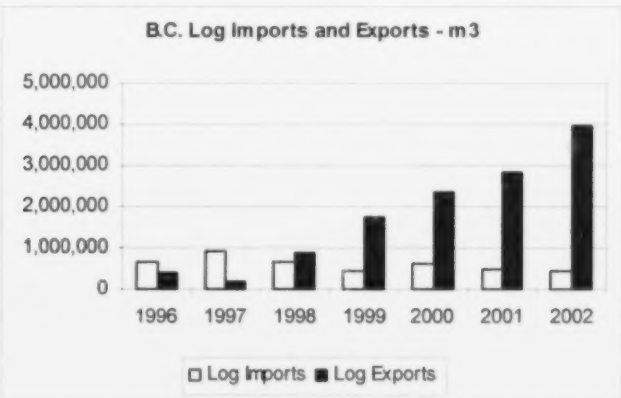
Chart 5 Vancouver Forest Region Log Production, 1975 to 2002



3.3 Log Imports and Exports

Log imports and exports are an important part of the Coastal timber supply. Over the last five years, B.C. has been a net exporter of logs. In 2002, B.C.'s log exports of 4 million m3 were 10 times greater than the 400,000 m3 in imports for that year. Also, B.C. exports consist mainly of sawlogs while B.C. log imports are mainly pulplogs or lower grade sawlogs that are lower valued on average than log exports. The data presented in this section are based on BC Stats data by species, grade and country. Appendix 3 provides more detail.

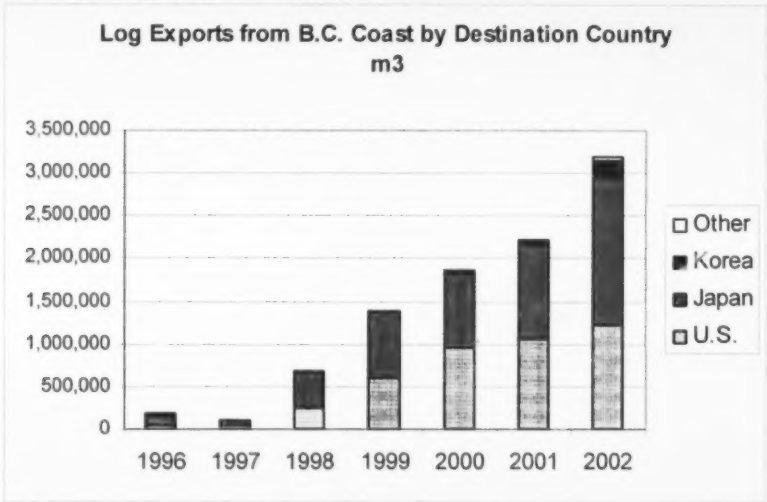
Chart 6 B.C. Log Imports and Exports, 1996-2002



Virtually all log imports into B.C. are from the United States, with some re-imports from Canada. Between 1996 and 2002, log imports into B.C. averaged approximately 600,000 m3 per year. Coastal mills process virtually all of B.C.'s log imports. Of the 4 million m3 in log exports in 2002, an estimated 3.2 million m3 are from the Coast and 773,000 m3 are from the B.C. Interior. The

majority of log exports from BC are destined to the U.S. or Japan and virtually all B.C. log exports to Japan and other Asian countries are from the B.C. Coast.

Chart 7 Log Exports from B.C. Coast by Country



The 2003 Coast Forest Region timber supply includes annual log imports averaging 600,000 m3, or slightly higher than the 400,000 m3 level assumed for 1996. Annual log exports of 3.2 million m3 are assumed for the Coast Forest Region, based on the 2002 export levels. This contrasts with the 1996 model where log exports were assumed at only 200,000 m3 per annum.

The estimated log exports from the B.C. Coast of 3.2 million m3 for 2002 account for 13.3% of the Coast Forest Region annual timber supply of 24.0 million m3 (net of recoverable waste). Log exports net of the 600,000 m3 in imports were 2.6 million m3, or 10.8% of the net annual timber supply.

The large growth in exports from the B.C. Coast is partly due to the countervailing and anti-dumping duties on U.S. lumber exports. In B.C., log exports are restricted and local manufacturers can block exports by purchasing the logs. With many Coastal mills temporarily closed, export blocking has been greatly reduced. In addition, the B.C. Government has lifted restrictions on exports in some areas to mitigate the negative impacts of the duties on the industry. For example, in 2002, the B.C. government provided the right to export up to 35% of the North Coast Forest District timber, with species restrictions on red cedar and cypress.[5]

3.4 Regional Timber Demand/ Log Usage

The B.C. regional timber demand for this study is defined as log usage by primary manufacturing facilities between 1996 and 2001, excluding the mills that are permanently shutdown effective March 2003. Regional timber demand/log usage in the Coast Forest Region is estimated at 17.8

[5] Also applies to Kalum and Kispiox Forest Districts (now Kispiox and Cranberry TSAs). Source: B.C. Ministry of Forests, *Notice to Exporters Concerning Order-In-Council (OIC) 121*, March 25, 2003.

million m3, down from approximately 25.3 million m3 in 1996, a drop of 7.5 million m3 or 30%.

Table 3 Regional Timber Demand/ Log Usage by Type of Manufacturing Facility

Timber Demand/ Log Usage	2003 Volume (000 m3)						Total - 1996
	Van. Island	Lower Mainland	Central Coast	QCI	North Coast	Total - 2003	
Sawmills	5,293	6,167	6	37	0	11,503	17,358
Veneer/Plywood Plants	388	628	0	0	0	1,015	550
Shake & Shingle Mills	136	682	0	20	0	838	1,260
Pole & Post Plants	64	26	0	0	0	90	n/a
Subtotal Saw & Shingle Logs	5,880	7,503	6	58	0	13,447	19,168
Chipping Plants	1,425	1,649	0	0	0	3,074	2,452
Woodrooms	1,125	100	0	0	0	1,225	3,708
Subtotal Pulplogs	2,550	1,749	0	0	0	4,299	6,160
Total	8,430	9,252	6	58	0	17,746	25,328
	48%	52%	0%	0%	0%		-30%

Notes:

1. This report is concerned only with primary facilities, namely those that process logs and/or chips. Secondary and tertiary manufacturing facilities are those using lumber, and other wood products, pulp and recycled fibre as their primary source of raw materials.
2. The 1996 data exclude the North Coast.

The permanent closures of 11 larger sawmills and several smaller sawmills account for approximately 4.2 million m3 of the 7.5 million m3 drop in log usage (excludes the closure of West Fraser Mills in the North Coast; a list of larger sawmill closures is included in Appendix 4). The balance, or 3.3 million m3 reflects lengthy temporary mill closures and other production curtailments at many Coastal sawmills as well as mill closures in the pulp and paper sector. In 1999, the Gold River pulp mill closed permanently. In 2001, the Powell River kraft market pulp mill and associated woodroom also closed permanently, although the integrated pulp and newsprint mill at that location remained opened.

The regional timber demand/log usage reflects the ability of the manufacturing facilities to compete in international markets given existing operating costs, product markets and prices. Manufacturing capacity in the Coast Forest Region has been much greater than log usage. There are 145 primary manufacturing facilities operating in Coastal B.C. (effective March 2003), which at operating capacity can consume on average approximately 25 million m^3 of logs per year, or some 7.5 million m3 greater than the 5 year log usage of 17.7 million m3 shown in the previous table. This is a conservative estimate of operating capacity, which could likely be augmented by adding a third shift to sawmill operations and/or restarting mothballed sawmills.

Table 4 Coast Forest Region Estimated Capacity Utilization Rates (2-Shifts)

Manufacturing Facilities	B.C. Coastal Region 2-Shift Capacity (Log Inputs in 000 m3)				Avg. Log Usage	
	Number	2-Shift Capacity Volume		Avg.	(000 m3)	% Utilization
Sawmills	78	16,539	66%	212	11,503	69.6%
Shake & Shingle	44	2,054	8%	47	838	40.8%
Plywood and Veneer	3	1,250	5%	244	1,015	81.2%
Chipping Plants	8	3,393	13%	424	3,074	90.6%
Woodrooms	5	1,850	7%	370	1,225	66.2%
Pole & Post Plants	7	119	0%		90	75.6%
Total Log Input	145	25,205	100.0%	174	17,746	70.4%
By Sub-Region:						
Vancouver Island	70	11,312	45%	162	8,430	74.5%
Lower Mainland	69	13,560	54%	197	9,252	68.2%
Mid-Coast, QCI & North Coast	6	333	1%	56	64	19.2%
Total	145	25,205	100%		17,746	70.4%

The sawmills in the Coast Forest Region are concentrated on Vancouver Island and in the Lower Mainland sub-regions. The Mid-Coast, Queen Charlotte Island (QCI) and North Coast Sub-Regions have approximately 1% of the primary processing capacity (based on average log usage). While there are approximately 78 sawmills in Coastal B.C., the largest 15 sawmills account for 59% of capacity (based on 2-shifts).

3.5 Regional Log Demand/Supply Balance

The analysis indicates that the current physical supply of timber exceeds current log usage by 3.66 million m3 even after accounting for the 3.2 million m3 in log exports.

The fibre supply and demand balance in Coastal B.C. has changed significantly over the last 5 or 6 years. In 1996, the Woodflow analysis reported that fibre supply in coastal B.C. was almost in balance with average log usage rates, with a fibre deficit of approximately 0.4 million m3 (This was based on 5 year average log usage, not 2-shift production capacity).

Table 5 Regional Log Supply/Demand Balance

	2003 Volume (000 m3)						
Timber Supply Components	Van. Island	Lower Mainland	Central Coast	QCI	North Coast	Total - 2003	Total - 1996 (000 m3)
Annual Timber Supply	14,825	4,201	2,724	1,725	530	24,006	24,270
Plus: Log Imports	200	400	0	0	0	600	915
Less: Log Exports	(1,650)	(1,093)	(271)	(155)	(31)	(3,200)	(200)
Available Timber Supply	13,375	3,508	2,453	1,570	499	21,406	24,985
	62%	16%	11%	7%	2%	100%	
Timber Demand/ Log Usage	8,430	9,252	6	58	0	17,746	25,328
Log Balance - Surplus/(Deficit)	4,945	(5,744)	2,447	1,513	499	3,660	(343)

Notes:

1. The 1996 supply and demand data exclude the North Coast.
2. In 1996, the log imports included 400,000 m3 from the U.S., 226,617 m3 from the North Coast (Interfor), and 288,510 m3 from the Interior. The 2003 log imports of 600,000 m3 are all from the U.S.

The fibre supply surplus reflects the increasingly difficult economic situation for B.C. Coastal mills in the last 5 years, as mills have struggled with rising logging costs and the softwood lumber countervailing duties.

A breakdown of net annual timber supply by species and sorts (peeler, sawlog, shingle and pulplog) was estimated using the 5 year Coast Grade Distribution reports provided by the Ministry of Forests. Log supply, demand and net balances are shown in the following table. The data show a large surplus of sawlogs (8.2 million m3) and a deficit of peelers and pulplogs. The indicated sort imbalances are adjusted by the industry moving logs between the various manufacturing facilities as markets and prices change, and as technology and management improve utilization. Also, utility grade sawlogs are often used as pulplogs.

Table 6 Regional Log Supply/Demand Balance by Industrial Sort

Supply/Demand by Log Sorts	2003 Volume (000 m3)			
	Supply	Demand	Supply/ Demand Balance	Net of Imports /Exports
Peelers	361	1,015	(654)	(654)
Sawlogs	19,789	11,593	8,196	5,596
Shingle Logs	1,082	838	244	244
Pulplogs	2,773	4,299	(1,526)	(1,526)
Subtotal	24,006	17,746	6,260	3,660
Imports / Exports	600	3,200	(2,600)	
Total			3,660	

Notes:
1. Pulplogs include all Grades X and Y logs; sawlogs include all utility grades (U-Grade) logs, even though they are often used as pulplogs.
2. The 600,000 m3 of imported logs include pulplogs and low grade sawlogs, but all imports were netted against log exports, and the balance was added to sawlogs.

3.6 Regional Chip Supply and Demand

There are eight pulp and paper mills in the Coast Forest Region that rely on softwood chips and log inputs in their production process.[6] These mills process approximately 12.6 million m3 of chips based on 5 year production rates (1996-2001). These pulp and paper operations obtain fibre as follows:

- Approximately 5.1 million m3 of chips are purchased from Coast Forest Region manufacturing facilities that produce chips as a by-product;
- Some 4.2 million m3 are produced by chipping plants and pulp mill woodrooms; and

[6] This excludes three facilities in the Lower Mainland. Scott Paper produces stone groundwood using cottonwood but does not use softwood. Domtar Vancouver Mill (previously Island Paper Mills) and Newstech Recycling are secondary manufacturers in the sense that they do not use raw wood fibre as an input. (The Crown Packaging paper bag manufacturing plant in Richmond, which was referred to in the 1996 Woodflow study, closed in 2001).

- Some 3.5 million m3 of chips are imported, nearly all of it from the B.C. Interior (chip imports from the U.S. are negligible particularly after netting chip exports).

This is shown in more detail in the table following.

Table 7 Coast Forest Region Chip Supply/Demand Balance

Regional Chip Sources	2003 Volume (000 m3) Van. Island	Lower Mainland	Other	Total	1996 Volume
Sawmills	2,020	2,241	0	4,261	6,132
Veneer/Plywood	193	200	0	397	170
Shake Mills & Other	64	339	0	402	618
Subtotal - Residual Chips	2,282	2,779	0	5,061	6,920
Chipping Plants	1,396	1,621	0	3,017	2,340
Pulpmill Woodrooms	1,088	97	0	1,185	3,523
Subtotal - Pulplog Chips	2,484	1,718	0	4,202	5,863
Total Domestic Supply	4,766	4,497	0	9,263	12,783
Chip Imports (B.C. Int. & U.S.)	1,585	1,900	0	3,485	3,180
Chip Exports	0	(169)	0	(169)	(400)
Net Imports	1,585	1,731	0	3,316	2,780
Total Chip Supply	6,351	6,228	0	12,579	15,563
Chip Supply %	50%	50%	0%	100%	
Pulpmill Chip Demand/ Usage	7,850	4,750	0	12,600	15,605
Chip Balance - Surplus/(Deficit)	(1,499)	1,478	0	(21)	41

Note: The 1996 data exclude the North Coast, which in that year included the Skeena Cellulose pulp mill in Prince Rupert.

Chip demand/ usage by pulp and paper mills on the B.C. Coast has dropped by approximately 3.0 million m3 or 19% since 1996. This mainly results from the closure of the Bowater pulp mill in Gold River, the closure of the woodroom and pulp mill in Powell River, and curtailments at some of the other pulp and paper operations:

- In 1999, Bowater permanently closed down the market pulp mill in Gold River on Vancouver Island, thereby resulting in a loss of 255,000 tonnes of market pulp capacity (approximately 1.5 million m3 in fibre input).

- In late 2001, NorskeCanada permanently closed the pulp mill and woodroom at Powell River.

- Other coastal pulp and paper mills have also experienced temporary shutdowns in recent years. For example, the Western Pulp Ltd. (Woodfibre) pulp mill in Squamish was shutdown for 4 months in the summer of 2001, was down again in December of 2001 and was down again in February, March and April 2002.

The drop of 3 million m3 in chip usage since 1996 is in addition to the 2.4 million m3 in fibre, which was used by the Skeena Cellulose pulp mill in Prince Rupert (much of which was sourced

from outside of what is now the Coast Forest Region). At that time, the mill was owned by Repap British Columbia Inc. and produced approximately 430,000 ADMT per year from two pulp lines.[7] The Skeena Cellulose pulp mill has been closed since 2001.

In April 2002, NWBC Timber Pulp Ltd. purchased Skeena Cellulose and renamed it New Skeena Forest Products Inc. Along with the pulp operation in Prince Rupert, the company owns four sawmills in the Northern Interior Forest Region including one in Smithers (Bulkley TSA), one in Terrace (Kalum TSA), one in Carnaby (Kispiox TSA) and one in Katwanga. NWBC reports that the four sawmills have a combined capacity of 480 million board feet per year, but they have also been closed since early 2001.

In February 2003, NWBC indicated its intentions to begin pulp production in the first half of 2003. NWBC reports its annual pulp capacity at 385,000 tonnes, which would require approximately 2.1 million m3 of pulplogs and chips. According to NWBC, it has two whole log chippers available, and the opening of the pulp mill does not depend on opening the lumber mills to supply residual chips.[8]

---

[7] B.C. Ministry of Forests, *Major Primary Timber Processing Facilities in B.C., 2000*, 2001.
[8] Mettrick, Alan, *Pulp Prices, Optimism Rise*, Prince Rupert Daily News, January 8, 2003. Also, Northwest B.C. Timber and Pulp press release, *NWBC Launches New Skeena Forest Products Inc.*, February 14, 2003; www.skena.ca.

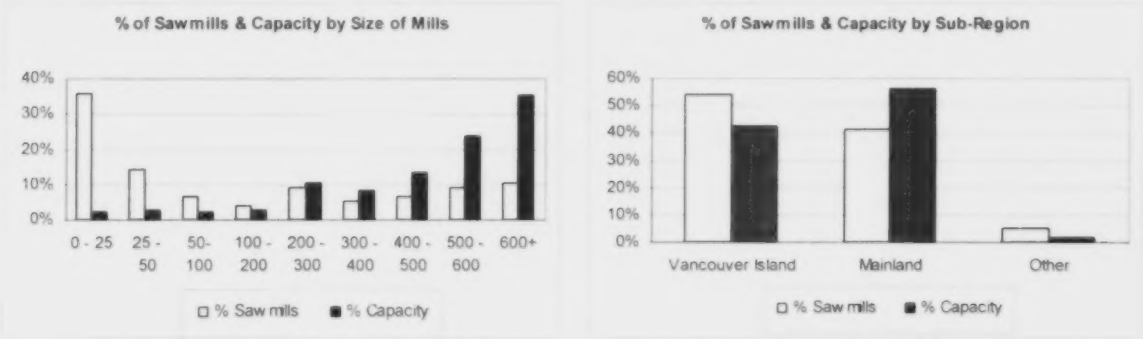
4 Manufacturing Facilities in the Coast Forest Region

Coastal B.C. has an extensive network of primary manufacturing facilities. This section describes the region's major primary manufacturing facilities and provides an overview of some of the major economic issues facing them. Appendix 5 provides more detail on the number, size and location of manufacturing facilities in the Coast Forest Region.

4.1 Sawmilling Sector

There are 78 operating sawmills located in the Coast Forest Region with the 8 largest sawmills accounting for 35% of capacity and the next 7 in size accounting for another 24%. The other 63 sawmills share the remaining 41% of sawmilling capacity (sawmilling capacity is expressed in terms of log input requirements at 2-shift capacity). The 78 sawmills include all mills that are currently operating (effective March 31, 2003) as well as those that are temporarily closed.

Chart 8 Coast Forest Region Sawmilling Capacity by Size of Mills and Sub-Region



Note: Appendix 5 provides more detail.

All but 4 small sawmills are based on Vancouver Island and in the Lower Mainland/Sunshine Coast area. Mills in those two sub-regions share 98% of the Coast's sawmilling capacity. On average, sawmills in Coastal B.C. can process 212,000 m3 of logs per annum (based on 2-shift capacity); the average for Vancouver Island is 166,000 m3 per annum or approximately half the average for the Lower Mainland/Sunshine Coast (289,000 m3 per annum).

Employment at operating sawmills totals 6,297 people; which represents 73% of the primary wood processing employment.

4.2 Other Wood Manufacturing Sector

The Coast Forest Region wood products sector has 44 shake and shingle mills, 3 plywood and veneer plants, 7 pole and post plants, and various log home mills, chipping plants and woodrooms. Only two small shake and shingle mills are based outside the Lower Mainland/Sunshine Coast and Vancouver Island sub-regions.

The three plywood/veneer plants have an average annual capacity of 1.25 million m3 of logs (assuming 2-shift capacity) and employ an estimated 815 people. Two are located in the Lower Mainland sub-region, and one is on Vancouver Island.

Custom chipping is gaining in importance in Coastal B.C., as there are only 4 pulp and paper mill woodrooms that remain in operation. These are located at the Crofton, Harmac, Port Alberni and Port Alice pulp and paper operations.

4.3 Pulp and Paper Sector in the Coast Forest Region

There are eight pulp and paper mills in the Coast Forest Region that utilize softwood chips and logs for their raw materials. These include:

- Howe Sound Pulp and Paper (HSPP), a pulp and newsprint operation that was completely rebuilt in the late 1980s/ early 1990s at a cost of $1.3 billion.
- The NorskeCanada facility at Port Alberni, which in 1994/1995 benefited from a $200 million investment to convert a paper machine from newsprint to light weight coated production (the market kraft pulp mill at that operation was permanently closed).
- The NorskeCanada facility at Crofton, which also benefited from significant investment in the last 10 years.
- Three facilities that were built in the 1950s and 1960s (including the Pope & Talbot mill near Nanaimo, NorskeCanada at Elk Falls and NorskeCanada's facility at Powell River).[9]
- The Western Pulp sulfite mill in Port Alice and the kraft pulp facility in Squamish, both of which have been in operation for approximately 75 years. The Port Alice facility is in need of major capital investment; the Woodfibre facility has been more continually upgraded over the years.

Together these pulp and paper operations directly employ 4,953 people, including 3,838 on Vancouver Island and 1,115 in the Lower Mainland/Sunshine Coast sub-region.

In addition to those 8 pulp and paper operations, there are three other paper making facilities in the Lower Mainland, but these do not use softwood chips or logs for their raw material:

- Scott Paper produces tissue papers from stone groundwood pulp using cottonwood, but does not use softwood.
- Island Paper Mills produces fine papers.
- Newstech Recycling produces newsprint from recycled fibres and purchased pulps.

These are secondary manufacturers in the sense that they do not use raw wood fibre as an input. Together they employ 1,192 people in the Lower Mainland.

---

[9] NorskeCanada operations at Crofton and Elk Falls were previously Fletcher Challenge facilities. The NorskeCanada mills in Port Alberni and in Powell River were previously owned by Pacifica Papers Inc. and before that, by MacMillan Bloedel. The Pope & Talbot operation was previously owned by Harmac Pacific and before that by MacMillan Bloedel.

The Ministry of Forests reports that the 8 primary pulp and paper operations have a production capacity of 3.7 million ADMT of market and integrated pulp per year, and 2.1 million tonnes of paper.

Table 8 Product Capacity of Pulp and Paper Operations in the Coast Forest Region

Primary Pulp and Paper Operations in Coastal B.C.	Annual Capacity 000 of Metric Tonnes			Closures since 2001
	Market Pulp Only	Market & Integrated Pulp	Paper	
Howe Sound Pulp and Paper		521.0	196.7	
NorskeCanada				
Crofton		773.5	398.5	
Duncan Bay (Elk Falls)		793.5	602.0	woodroom closed
Port Alberni		226.0	414.0	
Powell River		583.1	448.5	market pulp mill & woodroom closed
Pope & Talbot Ltd. (Harmac)	400.2			
Western Pulp Ltd. Partnership				
Port Alice	163.9			
Woodfibre	269.1			
TOTAL	833.2	2,897.1	2,059.7	
Average Per Mill	277.7	579.4	411.9	

Notes:
The capacity data are for 2001, but for Powell River, an estimated 50,000 MT in market pulp capacity was deducted from the market and integrated pulp capacity to recognize the permanent closure of the market pulp mill in November 2001.
Source: Ministry of Forests, *Survey of Major Primary Timber Processing Facilities for 2001.*

Excluding the pulp operations that also have paper mills, the average market pulp mill in Coastal B.C. has a capacity of approximately 277,700 Air Dry Metric Tonnes (ADMT) per year. By contrast, new operations have a capacity ranging between 400,000 ADMT and 500,000 ADMT per year.[10] The Pope & Talbot mill has a capacity of 400,000 ADMT, but this is from three separate lines instead of from a large modern production line.

The pulp and paper operations in Coastal B.C. process an estimated 12.6 million m3 of chips and logs. In addition, de-inked pulp and sawdust are used in the production of certain grades of pulp and paper. The volume of de-inked pulp, old newspapers (ONP) and sawdust are not considered in this analysis of woodflows.

4.4 Employment in the Coast Forest Region Forest Industry

The Coast Forest Region primary wood products and pulp and paper processing sectors employ 13,539 people (excluding the three secondary pulp and paper operations mentioned in the previous section). This is 27% fewer people than were employed in 1996.

[10] For example, the Alberta Pacific Kraft pulp mill built in 1992/1993 in Northern Alberta has an annual capacity of 500,000 ADMT of pulp. The Daishowa –Marubeni International Ltd. mill built in the Peace River in the late 1980s has a capacity of almost 400,000 ADMT of pulp per year.

Table 9 Summary of Employment in B.C. Coast Primary Manufacturing Facilities

B.C. COAST PRIMARY PROCESSING EMPLOYMENT	2003 Lower Mainland	Vancouver Island	Other	Total	% Change 1996-2003
Primary Facilities					
Sawmills	3,477	2,738		6,215	-33%
Shakes and Shingles	897	166		1,063	-23%
Pulp and Paper	1,115	3,838		4,953	-30%
Plywood, Veneer, Poles and Other	929	279	100	1,308	49%
2003 Total	6,418	7,021	100	13,539	-27%
	1996				
Primary Facilities					
Sawmills	5,401	3,826	61	9,288	
Shakes and Shingles	1,183	198		1,381	
Pulp and Paper	2,078	5,019		7,097	
Plywood, Veneer, Poles and Other	689	187		876	
1996 Total	9,351	9,230	61	18,642	

Notes:

1. In addition, in 2003, there were 1,192 employees at three secondary pulp and paper facilities including Scott Paper, Island Paper Mills and Newstech Recycling. Secondary manufacturing in 1996 accounted for 1,528 employees including those three mills and Crown Packaging, which closed in 2001.
2. In 1996, there were 2,900 employees in secondary wood products remanufacturing; up to date information is not available for 2003.
3. Excludes tertiary wood product sector (e.g. engineered wood products, furniture, millwork, etc.) and the paper converting sector.
4. The 1996 data exclude 850 people who were employed in primary processing mills in the North Coast sub-region, but these have been closed since 2001. (Appendix 5 provides more detail)

Between 1996 and 2003, employment losses ranged between 23% and 33% in the sawmilling sector, the shakes and shingles sector and the pulp and paper sector. Employment in other primary facilities increased between 1996 and 2003. The 2003 data include employment at 3 plywood and veneer plants whereas the 1996 data included only two of those plants, as one of the plants was assumed permanently closed at the time.

The harvesting of timber generates significant employment through logging, road construction and maintenance and silviculture. The 1996 Woodflow study reported that each m3 of timber on the Coast generates 0.52 PY of employment in harvesting and silviculture. More recent data on Coast logging employment are not readily available, but logging and silviculture data for all of B.C. show that on a per m3 basis, logging employment increased slightly in 1996, 1997 and 1998, but that it has since returned to the 1995 level.[11]

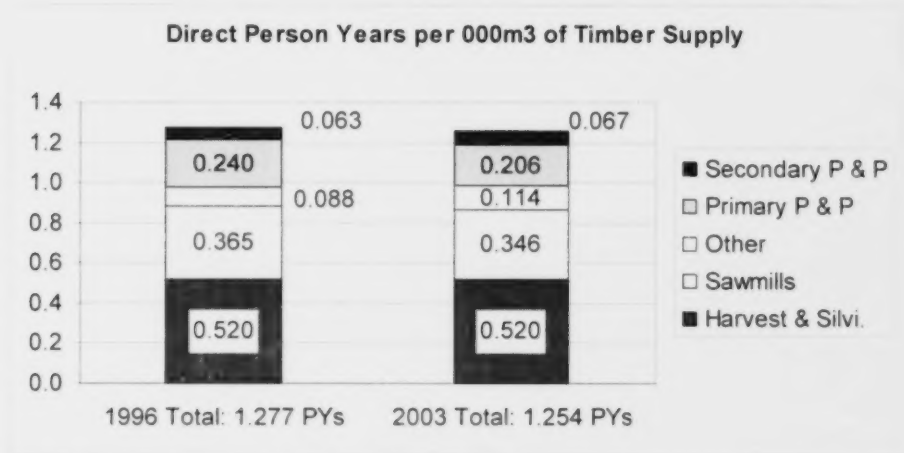
The harvesting and processing of wood from Coastal B.C. also generates employment through suppliers of goods and services to the forest industry (indirect employment) and through the re-

[11] In B.C., logging and silviculture employment generated 0.44 PYs per 000 m3 harvested in 1999, compared to 0.5 PYs per 000 m3 in 1997 and 1998, 0.47 PYs per 000 m3 in 1996 and 0.44 PYs per 000 m3 in 1995. Logging employment per m3 in Coastal B.C. would be higher than in the Interior. Source: based on data from PriceWaterhousCoopers, *The Forest Industry in B.C.*, 1999.

spending effects of the direct and indirect employees (induced employment).

Based on these employment figures and the fibre input data from the earlier sections, we have assessed total employment, direct employment coefficients per thousand m3 harvested, and direct employment coefficients per thousand m3 processed.

Chart 9 Coast Forest Region Direct Employment Coefficients per 000 m3 Harvested



Note: Does not add due to rounding.

The chart shows that direct employment expressed in Person Years (PYs) per 000 m3 of wood harvested has not changed significantly since 1996, despite the 27% decline in total employment. Total PYs per 000 m3 add to 1.254 PYs, compared to 1.277 PYs per 000 m3 in 1996. While the employment coefficient dropped in primary sawmilling and primary pulp and paper manufacturing, this decline was compensated through an increase in the coefficients for the other products.

The employment data have been adjusted to account for log and chip imports and for very low capacity utilization rates. The operating sawmills in the Lower Mainland and on Vancouver Island showed an average capacity utilization rate of 70% for 2001, compared to 82.4% in 1996[12], but it is unclear how the low utilization rates would impact PYs of employment. Even though mills might be shut down for a few weeks each year, for most employees, the sawmilling employment constitutes their only means of earning income. As a result, the coefficients were adjusted only for those facilities that showed utilization rates of less than 50%, i.e. the sawmilling facilities outside the Lower Mainland and Vancouver Island, and the shake and shingle operations.

Appendix 6 provides more detail on the methodology for estimating the employment coefficients.

Adjusting the employment coefficients for the drop in utilization rates for all sawmills in Coastal B.C. from 82.4% in 1996 to 70% in 2003 would reduce the employment coefficients by 0.05 PYs per 000 m3. While temporary shutdowns may not necessarily impact the number of people

[12] Ministry of Forests, Economic and Trade Branch, 1998.

employed, they would impact the average level of income per PY of employment, and ultimately the employment multiplier of forest industry jobs in the local communities.

The employment coefficients can be used to estimate the impact of changes in harvest levels on employment. However, a major shortcoming of these employment coefficients is that they assume linear relationships between timber supply and employment levels. While harvesting employment may be closely tied to the level of cut, processing employment is much more complex. Changes in timber supply in Coastal B.C. will likely cause changes in fibre utilization patterns, which will break down the linear relationship assumption. In addition, operating threshold levels and product market prices can heavily influence the timing of processing employment changes.

4.5 Issues Facing Forest Products Manufacturing in the Coast Forest Region

The forest industry in B.C. and particularly the Coast Forest Region has faced significant challenge in recent years[13]:

- The B.C. Coast was particularly affected by the decline in the Asian markets that started in 1998 and has resulted in particularly low prices for hemlock-balsam products, a species particular to Coastal B.C.

- The 1996 quota restrictions imposed by the Canada-U.S. Softwood Lumber Agreement affected the B.C. Coastal mills particularly negatively. The B.C. Coastal mills had been successful in diversifying into the Asian markets in the 1980s and by 1996, the Asian market had become the B.C. Coast's primary market with approximately 50% of the Coastal lumber production being exported to Japan. Since in 1996, negotiated shipping quotas into the U.S. market were awarded based on historical shipments to the U.S., and since the B.C. Coast served primarily the Asian markets, Coastal mills were awarded a quota of only 1 billion board feet of lumber. B.C. Interior mills obtained a 7.2 billion board feet quota since 80% of their lumber exports were to the U.S. (by comparison, the AAC for the B.C. Coast accounts for approximately one third of the provincial AAC)[14].

- In March 2001, the Canada-U.S. Softwood Lumber Agreement expired and U.S. lumber producers commenced various trade actions against Canadian softwood lumber producers. B.C. and Canadian mills are facing average countervailing and anti-dumping duties of 29%, which have essentially forced many sawmills throughout B.C. to close down, at least temporarily.

Even prior to the 29% countervailing duty, Coastal B.C. was on average the highest cost producing region when compared to sawmills in other North American regions. The chart following shows the direct costs of producing lumber by world supply regions (reproduced from

---

[13] This section on issues facing the forest industry is an updated version of an analysis prepared for the 2002 study by Pierce Lefebvre Consulting and Doug Ruffle & Associates for the Canadian Council of Ministers for the Environment.

[14] Between March 1996 and March 2001, B.C. had a volume quota on lumber exports to the U.S. of 8.2 billion board feet. While the Canada-U.S. Softwood Lumber Agreement brought some trading stability, it also restricted B.C. lumber exports to the U.S. For example, in 1987 and 1988, when markets were particularly strong and volume quotas were not in effect, B.C. producers shipped 9.2 billion board feet of lumber to the U.S. (Source: Council of Forest Industries Fact Book).

the report by Dr. Peter Pearse who documented the challenges facing the Coastal forest industry and the need for restructuring in a report titled '*Ready for Change, Crisis and Opportunity in the Coast Forest Industry*'; November 2001).

Chart 10 Costs of Producing Lumber by World Supply Region ($ per mfbm)

Notes: Labour and other direct costs in Canadian dollars per thousand board feet (mfbm) in 2001. Excludes cedar.
Source: Based on PriceWaterhouseCoopers data, as reported in Pearse, Dr. Peter, *Ready for Change*, 2001.

Although not highlighted on the above chart, fibre costs account for most of the direct costs of lumber excluding labour costs. According to PriceWaterhouseCoopers, in 1998, the average lumber manufacturing operating cost for all of B.C. was approximately $490 per mfbm, of which 50% was for fibre (net of chip by-product revenues), 20% for labour, salaries and benefits and the other 30% was for energy, materials, supplies, overhead and depreciation.[15]

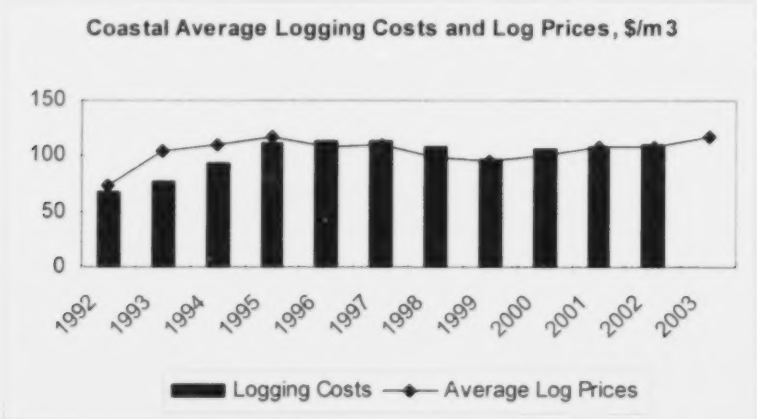
Between 1992 and 1996, logging costs on the B.C. Coast increased by 70% from $67 per m3 to $114 per m3, mainly as a result of increases in stumpage rates and greater regulatory costs resulting from the Forest Practices Code.[16] Logging costs on the B.C. Coast dropped in the latter part of the 1990s, but they have remained 61% higher than they were in 1992. Appendix 7 provides average logging costs for Coastal B.C. between 1992 and 2001.

The chart following shows that average logging costs for Coastal B.C. have exceeded or been

[15] Source: PriceWaterhouseCoopers, *The Forest Industry in B.C. 1998*.
[16] In 1995, the B.C. government enacted the Forest Practices Code (FPC), which prescribed measures to manage all values of the forest, including timber, fish, wildlife, water quality, biodiversity, soils, recreation and culture. In 1997, PriceWaterhouseCoopers estimated that road costs almost tripled between 1992 and 1997 (from $263 million in 1992 to $761 million in 1997) mainly due to the additional roads required to meet the FPC adjacency rules, smaller cut blocks, and higher road building and maintenance standards under the code.

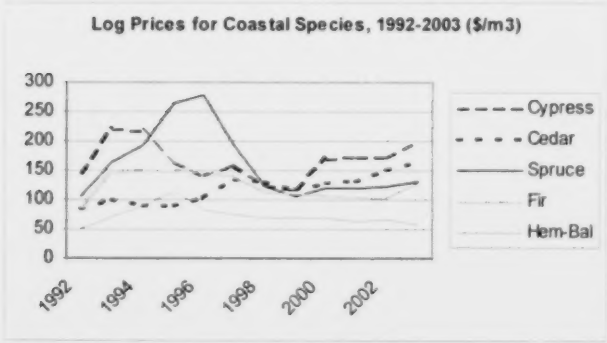
equal to average log prices since 1996.

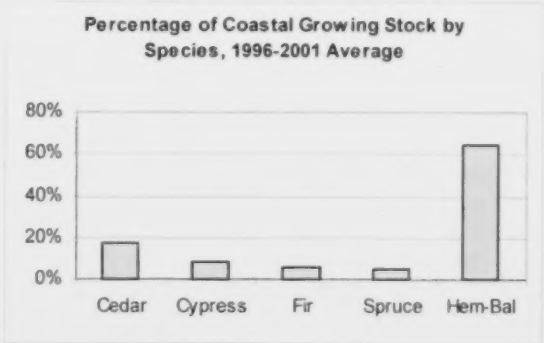
Chart 11 B.C. Coast Average Logging Costs and Log Prices



Log prices vary significantly by species with current average prices for hemlock-balsam logs approximately one third of those for cypress, for example.

Chart 12 B.C. Coast Log Prices and Percentage of Growing Stock by Species





Source: B.C. Coastal Sales Report.

Hemlock-balsam constitutes 64% of the growing stock in Coastal B.C., and hemlock-balsam log prices in 2003 are at $59 per m3 compared to a peak of $114 per m3 in 1995. Within a cut-block, the Ministry of Forests has required hemlock-balsam to be harvested at the same time as cedar and other logs. The high price associated with some species such as cypress, explain how helicopter logging, costing as much as $170.00 per m3, may be viable for certain species.

The relatively high lumber manufacturing costs on the B.C. Coast are partly due to the low utilization rates of the milling capacity. On average, wood processing mills currently operating in the Coast Forest Region have operated at 70.4% of capacity based on a 5 year production rate

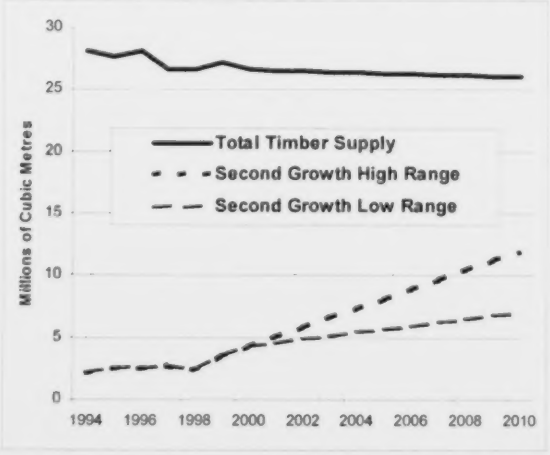
and the 2001 2-shift capacity (Section 3 on Log Usage).

As noted in the report by Dr. Peter Pearse, the trend in modern sawmills is towards three shifts per day and an operating rate of 92% is required for an efficient industry.[17] Operating at 3 shifts per day results in lower cost per unit of output and it is already common in other operating regions. When the annual capacity data are calculated based on 3 shifts per day, the 5 year average operating rate for Coastal sawmills drops to 47% (from the 70% noted above).

Dr. Pearse reports that the Coastal Allowable Annual Cut (AAC) is expected to drop from the existing 21 million m3 per year to roughly 17 million m3 per year around the year 2040 (excluding harvest on private lands). Dr. Pearse also notes the change from old growth to second growth, which will require industry to reconfigure its manufacturing plants. Most manufacturing facilities on the Coast are designed to process large, old-growth logs and are not appropriate for manufacturing second growth.

The mix between old growth and second growth timber is expected to change significantly, with the percentage of second growth timber increasing from some 12% in 2000 to between 27% and 45% by the year 2010. This change from old growth to second growth is well documented in the report by Dr. Peter Pearse on the Coastal forest industry and a graph presented in that report is reproduced following to help demonstrate the trend towards second growth harvesting.

Chart 13 Second Growth Component of Coast Timber Supply



Note: Timber supply includes AAC on regulated lands and the unregulated harvest.
Source: Dr. Peter Pearse, *Ready for Change*, 2001; based on Ministry of Forests data.

Dr. Pearse speculates on some of the changes that may result from this transition from old growth to second growth timber. The second growth logs have "fewer defects and decay, are more uniform, and easier to handle with machinery".[18] Also, the change to second growth will require significant capital investment as sawmills that process second growth logs will be much larger, processing on average between 650,000 and 850,000 m^3 per year compared to the average log input of 212,000 m^3 per year for the existing Coastal B.C. sawmills (based on 2-shift

[17] Pearse, Dr. Peter, *Ready for Change*, 2001.
[18] Ibid, page 9.

capacity).

In early 2003, the B.C. Government outlined major policy changes to help foster the growth of the B.C. forest industry:

- Through legislation, licensees will be required to return approximately 20% of their tenures to the Crown; half of this will be awarded to woodlots, community forests and First Nations and the other half will be sold at auctions.

- BC Timber Sales previously awarded under the Small Business Forest Entreprise Program (SBFEP) will be awarded only on the basis of price (under the SBFEP, approximately half of the 13% sold under this program took other factors such as employment and value-added investment into consideration).

- Forest Licenses and Tree Farm Licenses could be made freely transferable (the current Forest Act requires the payment of a "transfer tax" equal to a 5% AAC reduction, which may be waived under certain conditions such as the purchaser undertaking to maintain or create employment).

- There will no longer be any penalties for failing to cut timber, but licensees will not be able to carry forward any uncut timber to future periods.

- Government will remove appurtenance and timber processing requirements that direct a tenure holder to process timber at a specific mill or facility.

- Log export restrictions will be maintained on Crown lands.

- Stumpage rates will be based on log prices set at auctions; since a greater portion of logs will be auctioned, stumpage rates are expected to be more responsive to market changes.

It is outside the scope of this study to speculate on the impacts of these policy changes on woodflows in the Coast Forest Region, but log usage over time will likely reflect market trends even more than has been the case under the current system.

The woodflow balances show a fibre supply surplus of 3.6 million m3 even after exports of 3.2 million m3 are taken into account. The two shift milling capacity shows that existing mills could process as much as 25 million m3, which is fairly comparable to the net timber supply of 24 million m3, but market conditions are such that log usage is only 17.7 million m3. As the long term timber supply is expected to decline by 3 or 4 million m3, there may be increasing pressure on mills to become larger and more efficient, thereby replacing some of the smaller operations.

The balance of the report presents a sub-regional analysis of woodflows.

5 Sub-Regional Analysis

This section of the report and accompanying charts summarize fibre flows for each of the Coast Forest Region sub-regions. The 2003 analysis is compared to the data collected as part of the woodflow analysis conducted for the Vancouver Forest Region in 1996.

5.1 Lower Mainland/Sunshine Coast

The timber supply for the Lower Mainland/Sunshine Coast sub-region (referred to as the Lower Mainland sub-region) is estimated at 4.2 million m3 per annum, net of recoverable waste. By comparison, log usage by mills in the Lower Mainland sub-region adds to 9.3 million m3 per annum. With net exports of 0.7 million m3, the Lower Mainland sub-region requires log transfers of 5.7 million m3 per year from the other sub-regions to maintain its manufacturing facilities.

Table 10 Lower Mainland Sub-Region Net Timber Supply, 1996 and 2003

	Lower Mainland (000 m3)			
Timber Supply by Tenure	1996	2003	Change (+ or -)	% Change
Timber Supply Areas	3,095	2,786	(310)	-10%
Tree Farm Licences	1,993	1,016	(977)	-49%
Timber Licences	753	195	(558)	-74%
Total from Crown Lands	5,841	3,997	(1,844)	-32%
Private Lands	229	379	150	66%
Total Annual Timber Supply	6,070	4,376	(1,694)	-28%
Less: Recoverable Waste	426	175	(251)	-59%
Net Annual Timber Supply	5,644	4,201	(1,443)	-26%

Table 11 Lower Mainland Sub-Region Log Usage, 1996 and 2003

	Lower Mainland (000 m3)			
Timber Demand/ Log Usage	1996	2003	Change (+ or -)	% Change
Sawmills	9,957	6,167	(3,790)	-38%
Veneer/Plywood Plants	350	628	278	79%
Shake & Shingle Mills	1,088	682	(406)	-37%
Pole & Post Plants	n/a	26	n/a	n/a
Subtotal Saw & Shingle Logs	11,395	7,503	(3,892)	-34%
Chipping Plants	1,355	1,649	294	22%
Woodrooms	1,026	100	(926)	-90%
Subtotal Pulplogs	2,381	1,749	(632)	-27%
Total	13,776	9,252	(4,524)	-33%

The log transfer from other sub-regions of 5.7 million m3 is less than what was required in 1996

as most of the large wood processing operations that permanently closed in recent years on the B.C. Coast are located in the Lower Mainland sub-region. Larger mills that have permanently closed in the Coast Forest Region processed an estimated 4.5 million m3, and of this reduced capacity, 73% or 3.3 million m3 was from mills closing in the Lower Mainland sub-region (Appendix 4 lists some of those mills with approximate number of employees and log input).

The following table shows the fibre supply situation for the Lower Mainland sub-region by log sort.

Table 12 Lower Mainland Sub-Region Supply/Demand by Industrial Sort

	2003 Volume (000 m3)			1996
Lower Mainland Supply/Demand	Supply	Demand	Net Balance	Net Balance
Peelers	132	628	(495)	(217)
Sawlogs	3,442	6,193	(2,751)	(5,235)
Shingle Logs	118	682	(565)	(898)
Pulplogs	509	1,749	(1,240)	(1,066)
Subtotal	4,201	9,252	(5,051)	(7,416)
Log Imports / Exports	400	1,093	(693)	
Subtotal Logs	4,601	10,344	(5,744)	
Chips	6,228	4,750	1,478	1,102
Total Fibre	10,829	15,094	(4,265)	

The Lower Mainland chip supply is approximately 6.2 million m3, which includes imported chips from the Interior (approximately 1.9 million m3) and the U.S. Chip exports outside the Coastal region are estimated at 169,000 m3, most of which go the U.S. Pacific Northwest (chip exports from the Interior through the Lower Mainland ports are excluded from the fibre flow analysis).

The three pulp and paper mills on the Sunshine Coast consume an estimated 4.7 million m3 of chips per annum (based on 5 year production rate). Chip imports from the B.C. Interior to the Lower Mainland sub-region doubled since 1996 from almost 900,000 m3 to 1.9 million m3. The flow of chips throughout the Coast Forest Region has less to do with geography than it does with inter-company arrangements and species requirements.

The surplus chips from the Lower Mainland sub-region of 1.5 million m3 per annum are transferred to the Vancouver Island sub-region. This is slightly higher than the 1.1 million m3 in chip surplus for 1996.

The log deficit for the Lower Mainland of 5.7 million m3 is partly offset by the 1.5 million m3 surplus of chips to result in a net fibre deficit on the Lower Mainland of 4.3 million m3.

The chart on the following page presents the fibre flow for the Lower Mainland sub-region.

Chart 14 Lower Mainland Sub-Region Fibre Flows (m3)

5.2 Vancouver Island

The annual timber supply from Crown and private lands on Vancouver Island is 14.8 million m3. Of this, 68% is from Crown lands (10.5 million m3 before netting out recoverable waste) and 32% is from private lands (5.0 million m3 before netting out recoverable waste). The annual log production from private lands has increased in recent years on Vancouver Island from the 3.2 million m3 estimated in 1996:

- Private land holdings are making a switch to second growth, which is increasing the level of cut.
- Companies with private lands may be selecting a shorter rotation schedule than in the past, thereby allowing their sustainable level of cut to increase.

For Vancouver Island, the increase in net timber supply from private lands between 1996 and 2003 has more than compensated for the decline in timber supply from Crown lands.

Table 13 Vancouver Island Net Timber Supply, 1996 and 2003

	Vancouver Island (000 m3)			
Timber Supply by Tenure	1996	2003	Change (+ or -)	% Change
Timber Supply Areas	2,184	1,793	(391)	-18%
Tree Farm Licences	9,243	8,315	(928)	-10%
Timber Licences	627	345	(282)	-45%
Total from Crown Lands	12,054	10,453	(1,601)	-13%
Private Lands	3,235	4,990	1,755	54%
Total Annual Timber Supply	15,289	15,443	154	1%
Less: Recoverable Waste	1,146	618	(528)	-46%
Net Annual Timber Supply	14,143	14,825	682	5%

Log usage on Vancouver Island for 2003 is estimated at 8.4 million m3 per annum, down 27% from the 11.5 million m3 estimated for 1996.

Log usage by the Vancouver Island sawmilling sector dropped by 2 million m3, but this is only about half the drop experienced by the sawmilling sector in the Lower Mainland sub-region. On Vancouver Island, an estimated 900,000 m3 of the 2 million m3 drop in log input results from the permanent closure of Campbell River Mills, CIPA Lumber in Nanaimo and the Interfor sawmill in Youbou. The balance results from production curtailments at operating mills.

Table 14 Vancouver Island Log Usage, 1996 and 2003

Timber Demand/ Log Usage	Vancouver Island (000 m3)			
	1996	2003	Change (+ or -)	% Change
Sawmills	7,322	5,293	(2,029)	-28%
Veneer/Plywood Plants	200	388	188	94%
Shake & Shingle Mills	172	136	(36)	-21%
Pole & Post Plants	n/a	64	n/a	n/a
Subtotal Saw & Shingle Logs	7,694	5,880	(1,814)	-24%
Chipping Plants	1,097	1,425	328	30%
Woodrooms	2,682	1,125	(1,557)	-58%
Subtotal Pulplogs	3,779	2,550	(1,229)	-33%
Total	11,473	8,430	(3,043)	-27%

Log usage by chipping plants and woodrooms on Vancouver Island dropped by more than half, as the only woodrooms that remain operating on Vancouver Island are at Crofton, Port Alice and Harmac. The closure of the Gold River pulp mill has significantly reduced the demand for chips by Vancouver Island mills.

In 2003, Vancouver Island continues to be in a chip deficit position, with 1.6 million m3 per annum imported from outside the Coast Forest Region and 1.5 million m3 per annum chip transferred from the Lower Mainland sub-region.

Table 15 Vancouver Island Supply/Demand Balance by Industrial Sort

Van.Island Supply/Demand	2003 Volume (000 m3)			1996
	Supply	Demand	Net Balance	Net Balance
Peelers	200	388	(188)	(25)
Sawlogs	12,422	5,357	7,065	2,583
Shingle Logs	654	136	518	543
Pulplogs	1,549	2,550	(1,001)	(432)
Subtotal	14,825	8,430	6,395	2,669
Log Imports / Exports	200	1,650	(1,450)	
Subtotal Logs	15,025	10,080	4,945	
Chips	6,351	7,850	(1,499)	(1,144)
Total Fibre	21,377	17,930	3,447	

Overall, Vancouver Island has an annual fibre surplus of approximately 3.4 million m3. This consists of a surplus of some 4.9 million m3 of logs (after net exports of 1.5 million m3) and a deficit of 1.5 million m3 of chips. The log surplus is transferred to the Lower Mainland sub-region, and chip transfers from the Lower Mainland cover the Vancouver Island chip deficit. The chart on the next page show fibre flows for Vancouver Island.

Chart 15 Vancouver Island Sub-Region Fibre Flows (m3)

5.3 Central Coast

The Central Coast has an annual net timber supply of 2.8 million m3 down from 3.5 million m3 in 1996. The drop results mainly from a 26% reduction (642,000 m3) in the AAC of the TSAs. Between 1996 and 2003, the AAC dropped by 9.3% for the Strathcona TSA, by 31% for the Kingcome TSA and by 23% for the Midcoast TSA.

Table 16 Central Coast Timber Supply, 1996 and 2003

	Central Coast (000 m3)			
Timber Supply by Tenure	1996	2003	Change (+ or -)	% Change
Timber Supply Areas	2,508	1,866	(642)	-26%
Tree Farm Licences	748	833	85	11%
Timber Licences	243	89	(154)	-63%
Total from Crown Lands	3,499	2,788	(711)	-20%
Private Lands	50	50	0	0%
Total Annual Timber Supply	3,549	2,838	(711)	-20%
Less: Recoverable Waste	266	114	(152)	-57%
Total Annual Timber Supply	3,283	2,724	(559)	-17%

Note: The allocation of the licenses between the Central Coast and Vancouver Island for the Kingcome and Strathcona TSAs has changed slightly between 1996 and 2003.

Local consumption of logs in the Central Coast is minimal and as a result, before log exports are taken into account, the sub-region has a log surplus of 2.7 million m3. An estimated 271,000 m3 is exported from the Central Coast out of the Coast Forest Region, resulting in a net log surplus of 2.4 million m3.

Table 17 Central Coast Annual Supply/Demand Balance by Industrial Sort

	2003 Volume (000 m3)			1996
Central Coast Supply/Demand	Supply	Demand	Net Balance	Net Balance
Peelers	29	0	29	12
Sawlogs	2,121	6	2,115	2,316
Shingle Logs	196	0	196	190
Pulplogs	379	0	379	743
Subtotal	2,724	6	2,718	3,261
Log Imports / Exports	0	271	(271)	
Subtotal Logs	2,724	277	2,447	
Chips	0	0	0	0
Total Fibre	2,724	277	2,447	

The 2.4 million m3 per annum log surplus is transferred to manufacturing plants in the Lower Mainland and Vancouver Island sub-regions. The extensive sorting and re-bundling of logs at centralized sort locations along the coast, log trading and a complex web of fibre agreements render it impractical to track the final destination of the timber.

Chart 16 Central Coast Sub-Region Fibre Flows (m3)

5.4 Queen Charlotte Islands

The AAC for the Queen Charlotte Islands (QCI) TSA is 361,000 m3, down 153,000 m3 or approximately 30% from the 1996 level of 514,000 m3. This woodflow analysis, however, shows an overall increase in the QCI timber supply between 1996 and 2003. This is due to accounting adjustments, which changed the allocation of the AACs for the TFLs between sub-regions. In particular the AAC for the QCI sub-region was increased and the AAC for the Lower Mainland was reduced.

Table 18 Queen Charlotte Islands Log Supply, 1996 and 2003

	Queen Charlotte Islands (000 m3)			
Timber Supply by Tenure	1996	2003	Change (+ or -)	% Change
Timber Supply Areas	514	361	(153)	-30%
Tree Farm Licences (note 1)	568	1,340	772	136%
Timber Licences	140	21	(119)	-85%
Total from Crown Lands	1,222	1,722	500	41%
Private Lands	75	75	0	0%
Total Annual Timber Supply	1,297	1,797	500	39%
Less: Recoverable Waste	97	72	(25)	-26%
Total Annual Timber Supply	1,200	1,725	525	44%

Note 1: The differences between 1996 and 2003 are partly due to changes in the sub-regional allocation of AACs for TFLs.

Log usage in QCI is minimal as demand for logs is limited to two small sawmills, which consume approximately 37,000 m3 per year, and some shingle operations that consume another 20,000 m3 of logs. No chips are produced or consumed in the region.

As a result of the low log usage, the QCI sub-region shows a surplus of 1.7 million m3 before log exports are taken into account. Log exports out of the Coast Forest Region are estimated at 0.2 million m3, which results in a net log surplus for the sub-region of approximately 1.5 million m3. As with the North Coast surplus, the QCI surplus is transferred to manufacturing plants in the Lower Mainland and Vancouver Island sub-regions. The chart on the next page shows fibre flows for QCI.

Table 19 QCI Supply/Demand Balance by Industrial Sort

	2003 Volume (000 m3)			1996
QCI Supply/Demand	Supply	Demand	Net Balance	Net Balance
Peelers	0	0	0	0
Sawlogs	1,368	37	1,330	767
Shingle Logs	94	20	74	56
Pulplogs	263	0	263	320
Subtotal	1,725	58	1,668	1,143
Log Imports / Exports	0	155	(155)	
Subtotal Logs	1,725	213	1,513	
Chips	0	0	0	0
Total Fibre	1,725	213	1,513	

Chart 17 Queen Charlotte Islands Sub-Region Fibre Flows (m3)

5.5 North Coast

The annual timber supply for the North Coast is estimated at 0.5 million m3 net of recoverable waste. In 2002, the North Coast became part of the Coast Forest Region, but was not included in the 1996 Woodflow study of the Vancouver Forest Region.

Table 20 North Coast Timber Supply

Timber Supply by Tenure	2003 Volume (000 m3)
Timber Supply Areas	547
Tree Farm Licences	0
Timber Licences	5
Private Lands	0
Total Annual Timber Supply	552
Less: Recoverable Waste	22
Total Annual Timber Supply	530

The current log usage for the North Coast is minimal, but in 1996, wood products and pulp and paper facilities processed an estimated 2.9 million m3 in fibre and employed some 850 people. This included:

- West Fraser Mills sawmill in Prince Rupert, which had a milling capacity of 72 million board feet of lumber (approximate log input of 300,000 m3).
- West Fraser chip mill also in Prince Rupert, which had a milling capacity of 150,000 m3 (76,800 BDUs).
- Repap British Columbia Inc., which at that time operated a bleached kraft pulp operation with an annual capacity of 430,000 ADMT of pulp (requiring approximately 2.4 million m3 of chips based on 5.5 m3 per ADMT of pulp).[19]

The minimal current log usage translates into a log surplus for the North Coast of approximately 0.5 million m3. The following page shows fibre flows for the North Coast.

Table 21 North Coast Supply/Demand by Industrial Sort

North Coast Supply/Demand	2003 Volume (000 m3)		
	Supply	Demand	Net Balance
Peelers	0	0	0
Sawlogs	437	0	437
Shingle Logs	20	0	20
Pulplogs	72	0	72
Subtotal	530	0	530
Log Imports / Exports	0	31	(31)
Subtotal Logs	530	31	499
Chips	0	0	0
Total Fibre	530	31	499

[19] B.C. Ministry of Forests, *Major Primary Timber Processing Facilities in British Columbia*, 2001

Chart 18 North Coast Sub-Region Fibre Flows (m3)

APPENDIX 1 LOG PRODUCTION AND VANCOUVER LOG MARKET VOLUMES

Vancouver Forest Region Log Production and Vancouver Log Market Volumes (cubic meters)						
Year	VRF	Vancouver Log Market				
	Conifer Log Production (1)	Total Volume Traded	% of Logs Produced	Sawlogs Traded	Pulplogs Traded	% of Pulplogs Traded
1975	21,351,000	3,416,769	16.0%	2,922,422	494,347	14.5%
1976	32,196,000	4,491,113	13.9%	3,751,343	739,770	16.5%
1977	28,572,000	4,931,276	17.3%	4,201,305	729,971	14.8%
1978	32,338,000	4,251,591	13.1%	3,618,928	632,663	14.9%
1979	30,566,000	3,892,406	12.7%	3,370,744	521,662	13.4%
1980	30,713,000	4,250,762	13.8%	3,429,586	821,176	19.3%
1981	22,453,000	2,143,182	9.5%	1,740,433	402,749	18.8%
1982	21,351,000	3,221,110	15.1%	2,533,483	687,627	21.3%
1983	26,846,000	4,108,005	15.3%	3,084,989	1,023,016	24.9%
1984	27,226,000	4,511,928	16.6%	3,489,570	1,022,358	22.7%
1985	27,722,000	6,509,613	23.5%	5,105,838	1,403,775	21.6%
1986	26,561,000	7,116,521	26.8%	5,733,344	1,383,177	19.4%
1987	33,791,000	7,455,842	22.1%	5,662,146	1,793,696	24.1%
1988	32,819,000	8,306,203	25.3%	5,930,436	2,375,767	28.6%
1989	29,940,000	7,625,749	25.5%	5,438,416	2,187,333	28.7%
1990	25,209,000	7,237,412	28.7%	5,378,305	1,859,107	25.7%
1991	24,760,000	7,200,825	29.1%	5,879,421	1,321,404	18.4%
1992	23,526,000	6,564,549	27.9%	5,398,722	1,165,827	17.8%
1993	25,105,000	6,371,147	25.4%	4,713,781	1,657,365	26.0%
1994	23,344,000	7,429,960	31.8%	5,120,066	2,309,894	31.1%
1995	24,991,000	6,170,008	24.7%	3,863,644	2,306,364	37.4%
1996	22,093,000	5,046,977	22.8%	3,617,363	1,429,615	28.3%
1997	21,500,000	5,744,903	26.7%	4,701,120	1,043,783	18.2%
1998	18,868,000	4,191,745	22.2%	3,722,091	469,654	11.2%
1999	23,891,000	5,153,790	21.6%	4,422,981	730,809	14.2%
2000	25,370,000	5,229,674	20.6%	4,385,750	843,924	16.1%
2001	22,458,600	4,311,113	19.2%	3,734,710	576,403	13.4%
2002	21,808,363	3,884,057	17.8%	3,431,231	452,826	11.7%
1975-2002 Avg.	25,977,463	5,384,580	20.7%	4,227,935	1,156,645	21.5%
1997-2002 Avg.	22,479,193	4,554,076	20.3%	3,939,353	614,723	13.5%

Note:

1. The log production for 1999, 2000, 2001 and 2002 includes approximately 200,000 m3 of deciduous. All other years include only the coniferous production.
2. The 2002 production includes the North Coast log production (628,113 m3). All other years exclude the North Coast.

Source: Log Production: Ministry of Forests. Vancouver Log Market statistics: *Log Sales Sort Report*, compiled by the Council of Forest Industries from Ministry of Forests statistics (Valuation Branch).

APPENDIX 2 B.C. COAST REGIONAL FIBRE FLOWS

Appendix 2-1: B.C. Coast Log Supply, 1996 and 2003

	1996 Vancouver Forest Region (m3)			2003 Coast Forest Region (m3)			% Change - 1996 to 2003
	Sub-total Major Co's	Others	Total	Sub-total Major Co's	Others	Total	
Timber Supply Areas							
Arrowsmith	133,252	345,128	478,380	102,829	264,171	367,000	-23%
Fraser	737,903	755,014	1,492,917	613,095	624,405	1,237,500	-17%
Kingcome	1,385,706	387,565	1,773,271	915,312	304,380	1,219,691	-31%
Mid Coast	890,620	140,269	1,030,889	661,564	133,436	795,000	-23%
North Coast				205,715	340,909	546,624	
Queen Charlotte Is.	24,292	490,043	514,335	12,108	348,892	361,000	-30%
Soo	357,191	145,017	502,208	353,972	149,028	503,000	0%
Strathcona	1,082,039	327,489	1,409,528	857,139	420,861	1,278,000	-9%
Sunshine Coast	875,366	224,634	1,100,000	831,598	213,402	1,045,000	-5%
Total TSAs	5,486,369	2,815,159	8,301,528	4,553,331	2,799,484	7,352,815	
	66%	34%		62%	38%		
% Change 1996-2003, Excl. North Coast				-21%	-13%	-18%	
Tree Farm Licenses	11,771,503	780,527	12,552,030	10,852,791	651,149	11,503,940	-8%
	94%	6%		94%	6%		
% Change 1996-2003, Excl. North Coast				-8%	-17%	-8%	
Timber Licences	1,553,000	210,000	1,763,000	480,000	175,000	655,000	-63%
% Change 1996-2003, Excl. North Coast				-69%	-19%	-63%	
Total Crown Lands	18,810,872	3,805,686	22,616,558	15,886,122	3,625,633	19,511,755	
	83%	17%		81%	19%		
% Change 1996-2003, Excl. North Coast				-17%	-14%	-16%	
Private Lands							
Managed Forests				3,425,000	394,000	3,819,000	
Unregulated Private Lands				0	1,675,000	1,675,000	
Total Private Lands	1,765,000	1,824,000	3,589,000	3,425,000	2,069,000	5,494,000	53%
	49%	51%		62%	38%		
% Change 1996-2003, Excl. North Coast				94%	13%	53%	
Total Annual Timber Supply	20,575,872	5,629,686	26,205,558	19,311,122	5,694,633	25,005,755	
Less Recoverable Waste	1,513,659	422,226	1,935,885	772,445	227,785	1,000,230	
Net Annual Timber Supply	19,062,213	5,207,460	24,269,673	18,538,677	5,466,848	24,005,525	
	79%	21%		77%	23%		
% Change 1996-2003, Excl. North Coast				-4%	-1%	-3%	
Recoverable waste	7.5%	7.5%	7.5%	4.0%	4.0%	4.0%	

Appendix 2-2: B.C. Coast Log Usage (Demand), 1996 and 2003

	1996 Vancouver Forest Region (m3)			2003 Coast Forest Region (m3)			% Change - 1996 to 2003
	Sub-total 5 Major Co's	Others	Total	Sub-total 5 Major Co's	Others	Total	
Net Annual Timber Supply	19,062,213	5,207,460	24,269,673	18,538,677	5,466,848	24,005,525	-1%
Log Demand/ Usage							
Sawmills	14,336,329	3,021,561	17,357,890	9,869,836	1,633,322	11,503,159	-34%
Veneer/Plywood	350,000	200,000	550,000	627,700	387,700	1,015,400	85%
Shake Mills	238,400	1,021,000	1,259,400	0	838,000	838,000	-33%
Pole & Post Plants	0	0	0	0	90,000	90,000	0%
Subtotal - Solid Wood Plants	14,924,729	4,242,561	19,167,290	10,497,536	2,949,022	13,446,559	-30%
% Change 1996-2003, Excl. North Coast				-29.7%	-30.5%	-29.8%	
Chipping Plants	1,710,000	742,000	2,452,000	2,260,000	814,000	3,074,000	25%
Pulpmill Woodrooms	3,708,421	0	3,708,421	1,225,000	0	1,225,000	-67%
Sub-total Pulplogs	5,418,421	742,000	6,160,421	3,485,000	814,000	4,299,000	-30%
Total Log Demand/ Usage	20,343,150	4,984,561	25,327,711	13,982,536	3,763,022	17,745,559	-30%
Log Position before Imports/Exports	(1,280,937)	222,899	(1,058,038)	4,556,141	1,703,825	6,259,966	
Log Imports - USA	0	400,000	400,000	200,000	400,000	600,000	
Log Imports - Interior	315,127	200,000	515,127	0	0	0	
Log Exports	0	(200,000)	(200,000)	(1,650,000)	(1,550,000)	(3,200,000)	
Net Imports	315,127	400,000	715,127	(1,450,000)	(1,150,000)	(2,600,000)	
Net Log Position, Surplus/(Deficit)	(965,810)	622,899	(342,911)	3,106,141	553,825	3,659,966	

Appendix 2-3: B.C. Coast Forest Region Timber Supply by Species/ Sorts, 2003

Net Annual Timber Supply by Species/Sorts :	Timber Supply (m3) Major Companies	Others	Total	Log Demand/ Usage (m3)	Variance (m3)
Douglas-fir:					
Peeler	273,594	87,484	361,078	1,015,400	(654,322)
Sawlog	3,862,652	1,119,935	4,982,586	1,388,417	3,594,170
Pulplog	244,722	75,507	320,229	653,550	(333,321)
Sub-total	4,380,968	1,282,925	5,663,894	3,057,367	2,606,527
Whitewoods:					
Sawlog	7,395,537	2,187,591	9,583,128	7,294,050	2,289,079
Pulplog	1,475,267	451,081	1,926,348	3,303,050	(1,376,702)
Sub-total	8,870,804	2,638,673	11,509,476	10,597,100	912,377
Cedar					
Shingle	848,698	233,047	1,081,745	838,000	243,745
Sawlog	3,403,497	1,014,641	4,418,138	2,766,187	1,651,950
Pulplog	286,279	83,528	369,807	342,400	27,407
Sub-total	4,538,473	1,331,216	5,869,689	3,946,587	1,923,102
Cypress					
Sawlog	626,247	179,292	805,540	144,505	661,035
Pulplog	122,185	34,741	156,926	0	156,926
Sub-total	748,432	214,034	962,465	144,505	817,961
Total Net Annual Timber Supply	18,538,677	5,466,848	24,005,525	17,745,559	6,259,966
All Species by Sort					
Peeler	273,594	87,484	361,078	1,015,400	(654,322)
Sawlog	15,287,933	4,501,459	19,789,392	11,593,159	8,196,233
Shingle	848,698	233,047	1,081,745	838,000	243,745
Pulplog	2,128,453	644,858	2,773,310	4,299,000	(1,525,690)
Total Net Annual Timber Supply	18,538,677	5,466,848	24,005,525	17,745,559	6,259,966

Appendix 2-4: Coast Forest Region Log Usage by Type of Mill, 2003

	2003 Log Demand/ Usage (m3)		
Log Usage by Type of Mill:	Major Companies	Others	Total
Sawmills			
Douglas-fir	1,144,067	217,350	1,361,417
Whitewoods	6,274,097	1,019,953	7,294,050
Cedar	2,307,168	396,020	2,703,187
Cypress	144,505	0	144,505
Sub-total Sawlogs	9,869,836	1,633,322	11,503,159
Veneer - Peelers	627,700	387,700	1,015,400
Shake Mills - Cedar Shingle	0	838,000	838,000
Pole & Post Plants			
Douglas-fir	0	27,000	27,000
Cedar	0	63,000	63,000
Chipping Plants			
Douglas-fir	399,000	144,550	543,550
Whitewoods	1,635,000	588,050	2,223,050
Cedar	226,000	81,400	307,400
Cypress	0	0	0
Sub-total C. Plants - Pulplogs	2,260,000	814,000	3,074,000
Pulpmill Woodrooms			
Douglas-fir	110,000	0	110,000
Whitewoods	1,080,000	0	1,080,000
Cedar	35,000	0	35,000
Cypress	0	0	0
Sub-total Pulpmills - Pulplogs	1,225,000	0	1,225,000
Sub-total Pulplogs	3,485,000	814,000	4,299,000
Total Log Usage	13,982,536	3,763,022	17,745,559

Appendix 2-5: B.C. Coast Chip Supply and Demand, 1996 and 2003

	1996 Vancouver Forest Region (m3)			2003 Coast Forest Region (m3)			% Change - 1996 to 2003
	Sub-total Major Co's	Others	Total	Sub-total Major Co's	Others	Total	
Chip Production							
Sawmills	3,330,106	2,801,363	6,131,469	3,656,422	604,883	4,261,306	-31%
Veneer/Plywood				116,480	280,800	397,280	
Shake & Shingle Mills				0	402,480	402,480	
Subtotal - Solid Wood Plants				3,772,902	1,288,163	5,061,066	
Chipping Plants (including exports)				2,223,260	794,040	3,017,300	
Pulpmill Woodrooms	3,523,000	0	3,523,000	1,185,000	0	1,185,000	-66%
Subtotal - From Pulplogs				3,408,260	794,040	4,202,300	
Other			3,129,162				
Total Production			12,783,631	7,181,162	2,082,203	9,263,366	-28%
Chip Imports	3,180,000			3,485,000	0	3,485,000	
Chip Exports		(400,000)		0	169,000	(169,000)	
Net Imports	3,180,000	(400,000)	2,780,000	3,485,000	(169,000)	3,316,000	
Total Chip Supply			15,563,631	10,666,162	1,913,203	12,579,366	
Pulpmill Chip Consumption	15,605,000		15,605,000	12,600,000		12,600,000	
Net Chip Position,Surplus/(Deficit)			(41,369)			(20,634)	

Note:
The major companies include: Doman/Western Pacific, Canfor/Howe Sound, TimberWest, Interfor, Weyerhaeuser, Mill & Timber, Richmond Plywood, Teal Cedar/J.S. Jones and Terminal Forest Products.

APPENDIX 3 B.C. AND COAST FOREST REGION LOG EXPORTS

This Appendix shows B.C. log exports for 1996 and 2002. The data are based on B.C. Stats data by species, grade and by country. *Pierce Lefebvre Consulting* developed estimates of export data from the B.C. Coast based on the following assumptions:

- All B.C. log exports to Japan and other Asian countries originate from the Coastal region, except for the log species that are predominantly from the Interior.
- For certain species of wood that are predominantly from the B.C. Interior, none of the log exports to the U.S. are assumed to be from Coastal areas. This includes the following classifications:
    - Balsam, fir and spruce pulpwood;
    - Other softwood logs for pulping;
    - Spruce;
    - Pine; and
    - All hardwoods
- For hemlock, all log exports to the U.S. are assumed to be from Coastal BC.

B.C. Log Exports by Destination Country (m3)							
	1996	1997	1998	1999	2000	2001	2002
U.S.	238,592	101,448	415,482	960,240	1,426,770	1,642,395	1,972,803
Japan	91,417	60,107	435,959	779,439	871,733	1,091,323	1,735,606
Korea	45,760	5,517	1,674	6,067	27,585	52,970	218,029
Other	1,768	1,069	2,199	6,696	16,492	26,528	37,585
Total	377,537	168,141	855,314	1,752,442	2,342,580	2,813,216	3,964,023

Estimated Log Exports from B.C. Coast Forest Region by Destination Country (m3)							
	1996	1997	1998	1999	2000	2001	2002
U.S.	48,421	46,025	251,702	603,668	960,355	1,054,136	1,213,966
Japan	91,213	58,655	421,596	779,388	871,147	1,090,465	1,731,873
Korea	45,589	5,517	1,674	5,621	27,237	51,149	208,030
Other	671	814	1,888	6,371	14,198	25,119	36,722
Total	185,894	111,011	676,860	1,395,048	1,872,937	2,220,869	3,190,591

APPENDIX 4 PARTIAL LIST OF PERMANENT SAWMILL CLOSURES IN COASTAL B.C.

The following lists some of the mills on the B.C. Coast that have permanently shutdown.

Name	*Location*	*Number of Employees*	*Approximate Year of Closure*	*Approximate Log Input (000 m3)*
Bayside Sawmills	Port Mellon	140	2001	205
Campbell River Mills Ltd.	Campbell River	85	1997	350
Canadian Forest Products Ltd. - Eburne Sawmill	Vancouver	241	1998	465
CIPA Lumber Co. Ltd.	Nanaimo	115	2001	285
International Forest Products Ltd. – Fraser Mills	Coquitlam	265	2000	700
International Forest Products Ltd. – McDonald Cedar	Fort Langley	130	1997	175
J.S. Jones	Boston Bar	190	2002	535
MacMillan Bloedel Ltd.	Powell River	260	1999	145
TimberWest Forest Ltd.	Youbou	174	2001	265
Tolko	North Vancouver	200	1997	500
Weyerhaeuser Company Ltd. (Canadian White Pine)	Vancouver	400	2000	545
Sub-Total -		**2,200**		**4,170**
North Coast				
West Fraser Mills	Prince Rupert	50	2002	300
Total		**2,250**		**4,470**

	Number of Employees		Approximate Log Input	
By Sub-Region:		**%**	**(000 m3)**	%
Lower Mainland	1,826	81%	3,270	73%
Vancouver Island	374	17%	900	20%
North Coast	50	2%	300	7%
Total	**2,250**	**100%**	**4,470**	100%

Notes:

1. The above list of mills is compiled for illustrative purposes and there may be other operations that have closed and are not included (smaller sawmilling operations that have closed are excluded).

Source: *List of Mill Closures Since July 1*, 1997 from Ministry of Forests; and various news releases.

APPENDIX 5 MANUFACTURING FACILITIES

This Appendix summarizes log input requirements for manufacturing facilities currently operating in the Coast Forest Region and by sub-region based on capacity (480 shifts per year). These data were estimated based on the facilities operating at their capacity levels as specified in the Ministry of Forests Survey of Major Primary Timber Processing Facilities for 2001, but include only the mills that are operating or temporarily closed effective March 31, 2003 (i.e. this excludes mills that were in operation in 2001 but have since been permanently closed).

Appendix 5-1 B.C. Coast Log Input Requirements at 2-Shift Capacity, 2003

Manufacturing Facilities by Range of Log Input	B.C. Coast Forest Region				Employment
	Number	Total Volume (000 m3)	% of Volume	Avg. (000 m3)	
Sawmills:					
0 - 25 (000 m3)	28	336	1.3%	12	
25 - 50	11	409	1.6%	37	
50-100	5	357	1.4%	71	
100 - 200	3	426	1.7%	142	
200 - 300	7	1,699	6.7%	243	
300 - 400	4	1,329	5.3%	332	
400 - 500	5	2,232	8.9%	446	
500 - 600	7	3,930	15.6%	561	
600+	8	5,821	23.1%	728	
Total Sawmills	**78**	**16,539**	**65.6%**	**212**	**6,297**
Shake & Shingle Mills:					
0 - 25	15	128	0.5%	9	
25 - 50	14	483	1.9%	35	
50-100	10	723	2.9%	72	
100 - 200	4	514	2.0%	129	
200+	1	206	0.8%	206	
Total S&S Mills	**44**	**2,054**	**8.1%**	**47**	**1,079**
Veneer Plants:					
300+	**3**	**1,250**	**5.0%**	**417**	**815**
Chipping Plants:					
0 - 200	2	109	0.4%	55	
200 - 300	1	295	1.2%	295	
300 - 400	2	758	3.0%	379	
400 - 500	0	0	0.0%	0	
500 - 600	0	0	0.0%	0	
600+	3	2,231	8.9%	744	
Total Chippers	**8**	**3,393**	**13.5%**	**424**	**114**
Woodrooms:					
0 - 500	4	1,100	4.4%	275	
500 - 1000	1	750	3.0%	750	
1000 +	0	0	0.0%	0	
Total Woodrooms	**5**	**1,850**	**7.3%**	**370**	
Pole & Post Plants:					
0 - 100	**7**	**119**	**0.5%**	**17**	**42**
Total	**145**	**25,205**	**100.0%**	**174**	**8,347**
Other Primary Wood Processing					239
Primary Pulp and Paper Manufacturing					4,953
Secondary Pulp and Paper Manufacturing					1,192
Total					**14,731**

Note: The woodrooms include the stone groundwood plant at Powell River and 4 woodrooms at other locations

Appendix 5-2 Log Input Requirements at 2-Shift Capacity for Vancouver Island, 2003

Manufacturing Facilities by Range of Log Input	Vancouver Island			
	Number	Total Volume (000 m3)	Avg. (000 m3)	Employment
Sawmills:				
0 - 25 (000 m3)	20	237	12	
25 - 50	5	178	36	
50-100	3	226	75	
100 - 200	1	172	172	
200 - 300	2	450	225	
300 - 400	2	607	304	
400 - 500	2	975	488	
500 - 600	4	2,263	566	
600+	3	1,881	627	
Total Sawmills	**42**	**6,989**	**166**	**2,738**
Shake & Shingle Mills:				
0 - 25	9	83	9	
25 - 50	4	159	40	
50-100	1	60	60	
100 - 200	1	117	117	
200+	0	0	0	
Total S&S Mills	**15**	**419**	**28**	**166**
Chipping Plants:				
0 - 200	0	0	0	
200 - 300	0	0	0	
300 - 400	2	758	379	
400 - 500	0	0	0	
500 - 600	0	0	0	
600+	1	731	731	
Total Chippers	**3**	**1,489**	**496**	**62**
Woodrooms:				
0 - 500	3	1,000	333	
500 - 1000	1	750	750	
1000 +	0	0	0	
Total Woodrooms	**4**	**1,750**	**438**	
Veneer, Pole & Post Plants:				
0 - 100	**6**	**665**	**613**	**144**
Total	**70**	**11,312**	**162**	**3,110**
Other Primary Wood Processing				73
Pulp and Paper				3,838
Total				**7,021**

Appendix 5-3 Log Input Requirements at 2-Shift Capacity for Lower Mainland/Sunshine Coast, 2003

Manufacturing Facilities by Range of Log Input	Lower Mainland/Sunshine Coast			
	Number	Total Volume (000 m3)	Avg. (000 m3)	Employment
Sawmills:				
0 - 25 (000 m3)	7	91	13	
25 - 50	5	195	39	
50-100	2	131	66	
100 - 200	0	0	0	
200 - 300	5	1,249	250	
300 - 400	2	722	361	
400 - 500	3	1,257	419	
500 - 600	3	1,667	556	
600+	5	3,940	788	
Total Sawmills	**32**	**9,252**	**289**	**3,477**
Shake & Shingle Mills:				
0 - 25	5	41	8	
25 - 50	9	293	33	
50-100	9	663	74	
100 - 200	3	397	132	
200+	1	206	206	
Total S&S Mills	**27**	**1,600**	**59**	**897**
Chipping Plants:				
0 - 200	2	109	55	
200 - 300	1	295	295	
300 - 400	0	0	0	
400 - 500	0	0	0	
500 - 600	0	0	0	
600+	2	1,500	750	
Total Chippers	**5**	**1,904**	**381**	**52**
Woodrooms:				
0 - 500	1	100	100	
500 - 1000	0	0	0	
1000 +	0	0	0	
Total Woodrooms	**1**	**100**	**100**	
Veneer, Pole & Post Plants:				
0 - 100	**4**	**704**	**352**	**713**
Total	**69**	**13,560**	**197**	**5,139**
Other Primary Wood Processing				164
Pulp and Paper				1,115
Total				**6,418**
Secondary Paper Manufacturing				1,192
Total				7,610

Appendix 5-4 Log Input Requirements at 2-Shift Capacity for QCI, Central Coast and North Coast, 2003

Manufacturing Facilities by Range of Log Input	QCI			
	Number	Total Volume (000 m3)	Avg. (000 m3)	Employment
Sawmills:				
0 - 25 (000 m3)	1	8	8	
25 - 50	1	36	36	
50-100	0	0	0	
100 - 200	1	134	134	
Total Sawmills	**3**	**178**	**59**	
Shake & Shingle Mills:				
0 - 25	1	4	4	
25 - 50	1	31	31	
Total S&S Mills	**2**	**35**	**35**	
Total	**5**	**213**	**43**	**65**

Manufacturing Facilities by Range of Log Input	Mid-coast			
	Number	Total Volume (000 m3)	Avg. (000 m3)	Employment
Sawmills:				
100 -200 (000 m3)	1	120	120	
Total	**1**	**120**	**120**	**35**

North Coast:

In the North Coast, there were three previously operating mills but they have been closed since 2001. They include:

- West Fraser Mills sawmill in Prince Rupert, which has a milling capacity of 72 million board feet of lumber (approximate log input of 300,000 m3).
- West Fraser chip mill also in Prince Rupert, which has a milling capacity of 150,000 m3 (76,800 BDUs).
- Repap British Columbia Inc., which at that time operated a bleached kraft pulp operation with an annual capacity of 430,000 ADMT of pulp (requiring approximately 2.4 million m3 of chips based on 5.5 m3 per ADMT of pulp, much of which was sourced from outside of what is now the Coast Forest Region). (In April 2002, NWBC Timber Pulp Ltd. purchased the pulp mill and in February 2003 indicated its intentions to begin production in the first half of 2003. NWBC reports its annual pulp capacity at 385,000 tonnes, which would require 2.1 million m3 of fibre).

During 1996, these operations employed 850 people.[20]

[20] B.C. Ministry of Forests, *North Coast Timber Supply Area Analysis Report*, November 1999.

APPENDIX 6 COEFFICIENTS OF DIRECT FOREST PRODUCTS EMPLOYMENT

Direct Employment Coefficients for the Coast Forest Region	Number of Person Years (PYs) per 000 m3 of Timber Supply		of Fibre Consumed	
	1996	2003	1996	2003
Harvesting and Silviculture	0.520	0.520		
Primary Processing:				
Sawmills	0.365	0.346	0.535	0.534
Shake & Shingle	0.054	0.041	1.096	0.863
Plywood and Veneer		0.046		0.803
Other	0.034	0.028	0.209	0.112
Sub-Total - Wood Products Processing	0.453	0.461		
Primary Pulp and Paper	0.240	0.206	0.465	0.394
Sub-Total - Primary Processing	0.694	0.666		
Secondary Pulp and Paper	0.063	0.067		
Total (Harvesting, Silviculture & Processing)	1.277	1.254		

Manufacturing Facilities	PYs of Employment - Not Adjusted	Capacity Utilization Rates	Adjusted Employment for Low Utilization and Imports	Net Timber Supply (000 m3)	PYs of Employment Per m3 of Timber Supply	PYs of Employment Per m3 of Fibre Consumed
Harvesting and Silviculture					0.52	
Primary Processing:						
Sawmills	6,215	69.6%	6,147	11,503	0.346	0.534
Shake & Shingle	1,063	40.8%	723	838	0.041	0.863
Plywood and Veneer	815	81.2%	815	1,015	0.046	0.803
Other	493		493	4,389	0.028	0.112
Sub-Total - Primary Processing	8,586	70.4%	8,178	17,746	0.461	
Primary Pulp and Paper	4,953		3,647		0.206	0.394
Sub-Total	13,539		11,825		0.666	
Secondary Pulp and Paper	1,192		1,192		0.067	
Total	14,731		13,017	17,746	0.734	

Notes to Appendix 6:

Employment for primary pulp and paper is adjusted based on the following breakdown of chip supply:		
Chip Supply	m3 of Log Input	
Local - Coast	9,263	73.6%
Net Imports	3,316	26.4%
Total	12,579	100.0%
Employment for shakes and shingles is allocated by region based on the following:		
Lower Mainland	897	84.38%
Vancouver Island	166	15.62%
	1,063	
Difference in S & S Jobs	340	

1. The timber supply represents the logs available for processing. The fibre consumed consists of the logs and chips consumed by the various mills.
2. Harvesting and silviculture coefficients are from the Socio-Economic Analyses conducted for each TSA on the B.C. Coast as part of the Timber Supply Review, Ministry of Forests (1994 to 2000).
3. Processing employment coefficients exclude the jobs created by logs and chips imported into Coast Forest Region from the U.S. and B.C. Interior.
4. Employment excludes the remanufacturing and tertiary wood products sector (e.g. engineered wood products, furniture, millwork, etc.) and the paper converting sector).
5. Includes only direct employment related to harvesting and processing the timber. These generally exclude the jobs related to the transportation of logs (barging), chips, lumber and other finished products. Head office employees and government employees are also excluded.
6. The harvesting and processing of wood from the Coast Forest Region would also generate employment through suppliers of goods and services to the forest industry and through the re-spending effects of the direct and indirect employees.

APPENDIX 7 B.C. COAST LOGGING COSTS AND LOG PRICES

The following tables show average coastal logging costs for the B.C. Coast between 1992 and 2001.

Average Coastal Logging Costs ($/m3)

	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001
Falling & Bucking	4.20	4.31	4.73	5.10	5.22	5.41	5.55	5.37	6.37	6.75
Yarding & Loading	11.11	11.91	13.42	16.33	17.53	14.30	12.98	13.42	15.23	15.10
Other Direct	21.96	23.89	25.96	29.65	29.99	24.15	22.93	22.88	25.29	27.37
	37.27	40.11	44.11	51.08	52.74	43.86	41.46	41.67	46.89	49.22
Stumpage & Royalty	10.14	13.65	21.39	26.58	25.84	27.17	23.01	17.28	16.99	14.93
Overhead and Roads	11.99	13.11	15.53	19.45	19.47	19.72	21.42	19.71	20.42	20.15
Head Office	7.60	9.12	11.60	14.14	15.51		12.35	10.81	11.06	12.18
Total	67.00	75.99	92.63	111.25	113.56		98.24	89.47	95.36	96.48
Helicopter Logging						8.55	9.32	7.52	10.45	11.52
Total	67.00	75.99	92.63	111.25	113.56		107.57	97.00	105.81	108.00

Notes:
1. Does not add due to rounding.
2. Costs are in expressed in current dollars (i.e. not adjusted for inflation).
3. The survey changed in 1997 and Head Office costs may not be directly comparable to previous years.
4. Starting in 1997, helicopter-logging costs were divided by total haul volume in order to estimate their overall impact on logging costs. The average helicopter logging costs based on heli-log volume (1,020,237 m3) only was $70.00 per m3 for the year 2000, but when averaged on the total volume logged, the impact adds to $10.45 per m3.

Source: PriceWaterhouseCoopers, 2002.

B.C. Coast Log Prices and Growing Stock by Species, 1992 to 2003

B.C. Coast Log Prices in Current $	Cedar	Cypress	Fir	Spruce	Hem-Bal	Average/ Total
1992	84.06	145.38	85.51	106.41	50.04	73.77
1993	101.11	219.29	147.71	164.39	72.01	103.41
1994	88.77	217.73	151.07	191.49	89.14	109.01
1995	89.81	164.98	150.63	263.36	114.17	117.14
1996	102.40	142.72	148.03	276.42	84.26	107.03
1997	134.38	158.45	141.44	191.42	76.21	110.32
1998	131.13	124.07	114.71	121.41	68.90	99.14
1999	117.79	117.96	111.75	106.48	69.03	95.39
2000	128.78	168.86	108.27	119.99	70.24	100.80
2001	131.07	171.87	106.03	120.62	65.17	107.35
2002	150.44	173.32	101.60	121.21	66.95	108.65
2003-1 QR	163.77	197.94	129.69	131.71	59.46	116.70
Average Growing Stock	17%	8%	6%	5%	64%	

Note: The average growing stock is for Crown tenures by species from 1996 to 2000.
Source: COFI Log Sales Report, 1992 to 2003.

APPENDIX 8 SELECTED REFERENCES

B.C. Ministry of Forests, *Major Primary Processing Facilities in British Columbia*, 1997-2001.
B.C. Ministry of Forests, *Appraisal Manual*, 2001.
B.C. Ministry of Forests, *B.C. Heartlands Economic Strategy, The Forestry Revitalization Plan*, 2003.
B.C. Ministry of Forests, *North Coast Timber Supply Area Analysis Report,* November 1999.
Coast Forest & Lumber Association, *Addressing the Coastal Challenge*, Selected Graphs, 2001.
Crown Corporations Secretariat, *Multiple Account Evaluation Guidelines,* 1994.
Pearse, Peter H., *Ready for Change, Crisis and Opportunity in the Coast Forest Industry*, A report to the Minister of Forests on British Columbia's Coastal Forest Industry, Vancouver November 2001.
Pierce Lefebvre Consulting and Doug Ruffle & Associates, *Study of Pollution Prevention Opportunities in the Coastal Forest Industry With Respect to Dioxins and Furans*, Canadian Council of Ministers of the Environment, draft report, June 2002.
Pierce Lefebvre Consulting and Simons Reid Collins, *Analysis of Woodflow in the Vancouver Forest Region*, 1996.
PriceWaterhouseCoopers, *The Forest Industry in B.C. 1999.*
Province of British Columbia, Canada, *US Softwood Lumber Trade Discussions, BC Proposed Forest Policy Changes*, Dec. 1981.
Simons Reid Collins and Pierce Lefebvre Consulting, *Analysis of Woodflow in the Vancouver Forest Region, Final Report*, Ministry of Forests, April 22, 1996.